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STEEL

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FOR FORTY-EIGHT YEARS—IRON TRADE REVIEW

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Comments

Readers are invited to comment upon articles, editorials, reports, prices or other editorial material appearing in STEEL. The editors cannot publish unsigned communications, but at their discretion may permit a writer to use a pseudonym when a bona fide reason exists for withholding his identity. Letters should be brief—preferably not exceeding 250 words.

Didn't Tell Whole Story

To the Editor:

Reading in STEEL (Feb. 21, page 27) the argument by a spokesman for the Ford Motor Co. to show how machinery makes employment rather than unemployment, I thought the illustration excellent as far as it went. But it stopped short of telling all the employment created by machines used in mass production.

Because Henry Ford and others engaged in making automobiles by the million developed the machinery to make them so cheap that everybody can own one or two, the demand for workers has mushroomed.

Not only are workers in the automotive industry greatly increased but the oil industry has been doubled and redoubled to furnish gasoline and lubricants; pipelines have required steel and tank cars more steel; filling stations have been built of steel and glass; pumps to measure the gas have required steel and operating mechanisms; tanks to store the gas, tin containers for oil and for antifreeze solutions; glassworks and upholstery manufacturers have been expanded and rubber works for tires and the other rubber applications in cars have given added employment the world over.

Had machinery not been invented to make cars cheaply and place them in almost every family great numbers of men now employed at good wages would be seeking some means of livelihood in other lines.

The instances I have mentioned are only a few of the secondary employments opened up by machinery. Their number is legion and they are found in every corner of industry. The radio, the incandescent light bulb for a few cents, mechanical refrigerators, and others all owe their cheapness and universal distribution to machinery which gives employment to millions.

Truly the machine is a means to the fuller life for all classes, not a device to take away the means of livelihood from the worker.

MANUFACTURER

Pittsburgh.

"Doing a Splendid Job"

To the Editor:

My attention has been called to your fine editorial in the Jan. 24 issue of STEEL, on the interdependence of the roadbuilding and steel industries, which I had missed seeing because of vacation.

Your editors are doing a splendid job in co-operating with the 265 manufacturers interested in the roadbuilding industry, and as president of their association I wish you would accept my thanks.

W. M. PARRISH

International Harvester Co., Chicago.

STEEL Busy Man's Friend

To the Editor:

Most of us so-called busy executives are, as you well know, actually pretty busy at that. When business is good we're pounding away trying to get all we can and worry about production. And then, when it is not so good we're twice as busy.

It is a relief and a pleasure, therefore, to find a publication that appreciates this fact and tries to help.

A lot of trade papers come into our office and I suppose they all contain well-written, worthwhile information but I simply haven't the time to give them. I am frank to say that your magazine STEEL gives me more information in a given amount of time than anything available in our field. I hope you can find a way to give me even more in less time!

And now, I must hurry back to the rock pile.

BUSY BEE

EDITOR'S NOTE: "Busy Bee" told us we could use his letter but not his name and we're sorry. Keeping STEEL brief and to the point will continue to keep us busy too.

The Rascal Is Caught

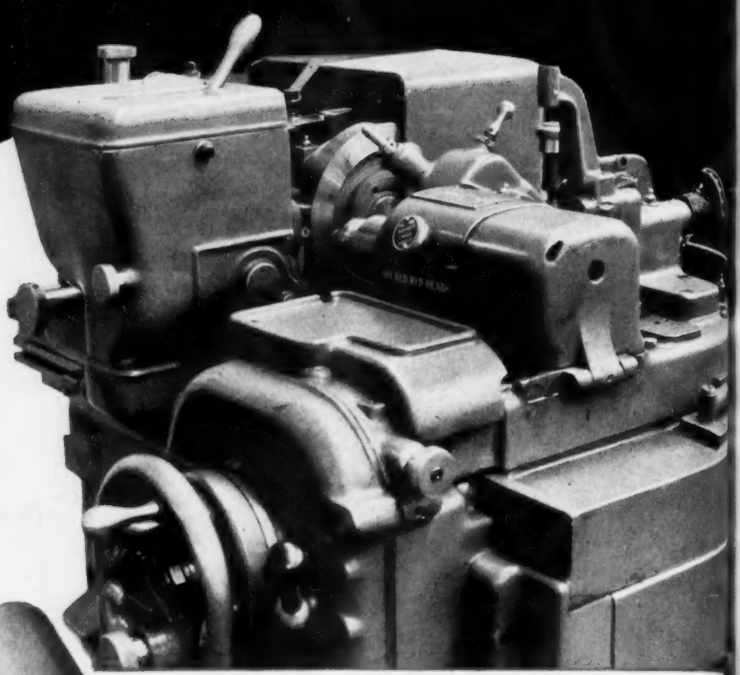
To the Editor:

In STEEL of Feb. 14, page 11, you mention about *"Watch for This Rascal."* We know all about it. He tried to do us, but could not. Gave us a check for $5000. He picked up different firms and was arrested in New York. No doubt now he is serving the balance of his 14-year term in the state prison of Nevada. He went under the name of R. G. Griffith, but his real name is Meredith.

H. D. HARVEY

Treasurer,
Monarch Engineering & Mfg. Co., Baltimore

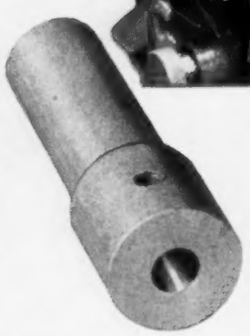
THE HEART OF THE DIESEL ENGINE IS GROUND on Heald Internals for ULTRA-PRECISION



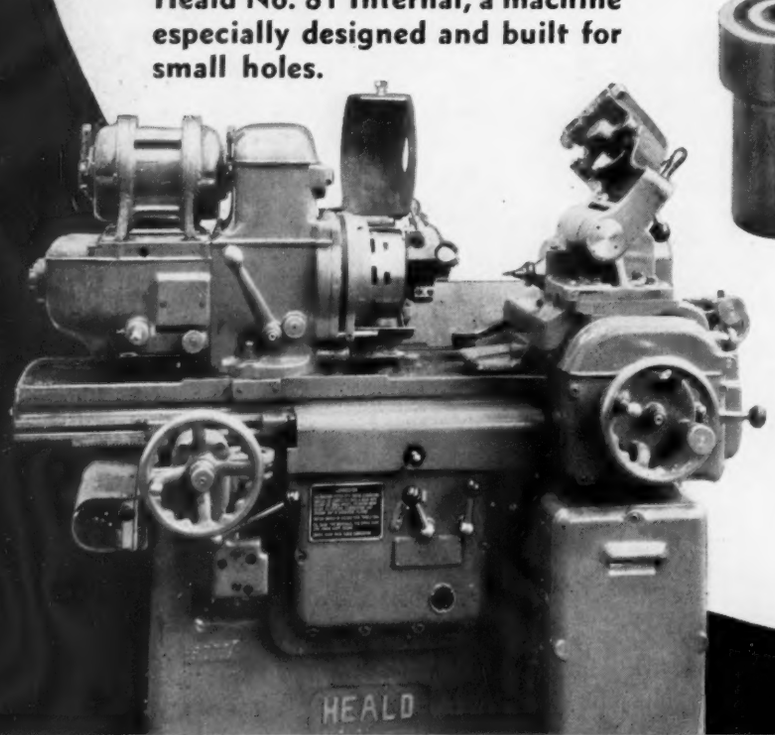
THE manufacturing of Diesel fuel injectors, the heart of a Diesel engine, is one of the most painstaking and important.

This is particularly true of the barrels and nozzles, the bores of which must be finished to the closest degree of accuracy in order to meet the requirements necessary to permit injection pressures up to as high as 20,000 lbs. per sq. in.

These bores, very small in diameter, are readily ground on the Heald No. 81 Internal, a machine especially designed and built for small holes.



FUEL INJECTION BARRELS The Heald No. 81 Hand Loading Centerless Internal Grinder has been found ideal for grinding injector barrels. Work can be removed and rechucked with exactly the same concentricity. This permits checking for size at any time and allows reversing very long barrels for grinding from each end.



DIESEL FUEL INJECTION NOZZLES Heald No. 81 Chuck Type Internals are used for grinding injection nozzles. Shown below is an installation for grinding a .2400" bore, a 58° seat and a .072" bore in the other end of the nozzle.

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STEEL

FOR FORTY-EIGHT YEARS—IRON TRADE REVIEW

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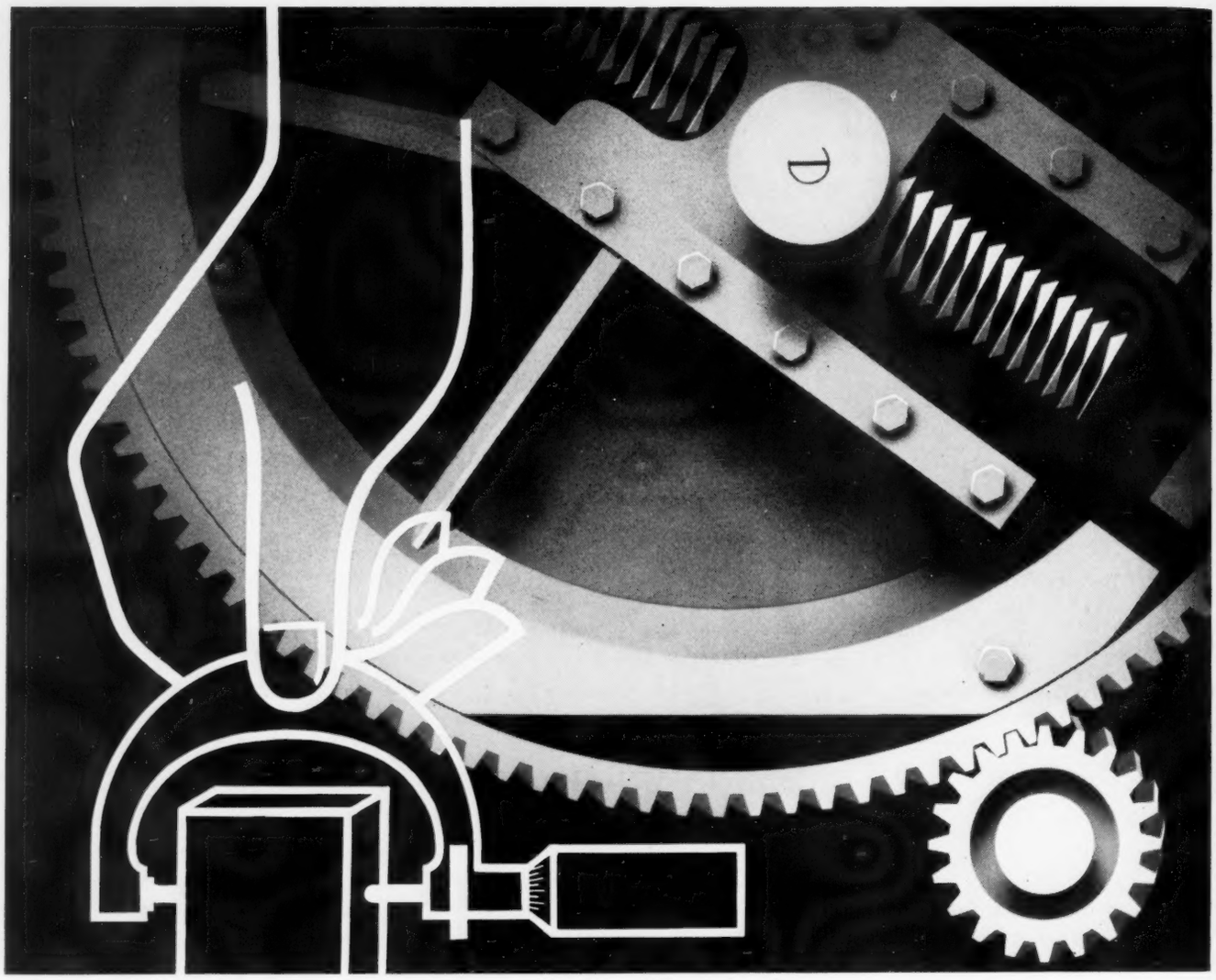

PRECISION

IT TAKES a precise machine to turn out precise work. And if its vital parts are made of Moly irons or steels, the longer maintenance of its precision is assured. Shapers, for instance.

One company building such machines uses 0.50% Mo, Nickel-Moly iron for main and intermediary gears in the power transmission system. This iron is used because ***it possesses the wear resistance which preserves the close tolerances necessary to prevent "chattering."*** Also—because it machines readily despite its comparatively high hardness.

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As the Editor Views the News

■ HOW MUCH steel will the railroads of this country buy in the next few years, when, as and if they are able to pay for it? While there is no definite answer to this question because of many undetermined factors, STEEL estimates, as the result of a careful survey (p. 17) that deferred purchases of rolled steel, forgings and castings by the railroads total approximately 7,500,000 gross tons. Included are 3,750,000 tons of rails, 165,000 freight cars and 2000 locomotives. This estimate makes due allowance for the trend toward new equipment of lighter weight. Most pressing need at this time is for new locomotives incorporating recent improvements in design that make for greater operating efficiency.

• • •

Ore Stocks Excessive

Iron ore stocks at lower lake docks and furnaces (p. 27) on May 1 will approximate 32,000,000 gross tons, about double the normal supply at the start of the shipping season. This excess results from heavy shipments in 1937 and low rate of consumption during the past four months. . . . While our steel plants are operating at about 30½ per cent, the steel industry of Canada (p. 20) is practically at full capacity, with a number of plant expansion programs under way. Principal cause of this activity is the huge British rearmament plan. . . . Exports of iron and steel products in January, not including scrap, were 229,565 gross tons, 33½ per cent below December; principal decrease (p. 20) was in tin plate, steel ingots and rails.

• • •

Increases Power

Cast iron and aluminum are challenged as standard materials for automobile cylinder heads (p. 29). Unusual records made with cylinder heads of copper - chromium - phosphorus alloy are said to herald changes in present specifications. The use of this copper alloy permits the design of solid metal with no water pockets; heads so made have yielded power increases up to 15 per cent. . . . In renewing its agreement with the Steel Workers Organizing committee (p. 23) Jones & Laughlin Steel Corp. has included the same stipulation recently included in the contract between SWOC and United States Steel Corp. subsidiaries; negotiations may be opened by either side on 10 days' notice; in the event no agreement is reached within 20 days the contract shall be void.

• • •

Metals Congress

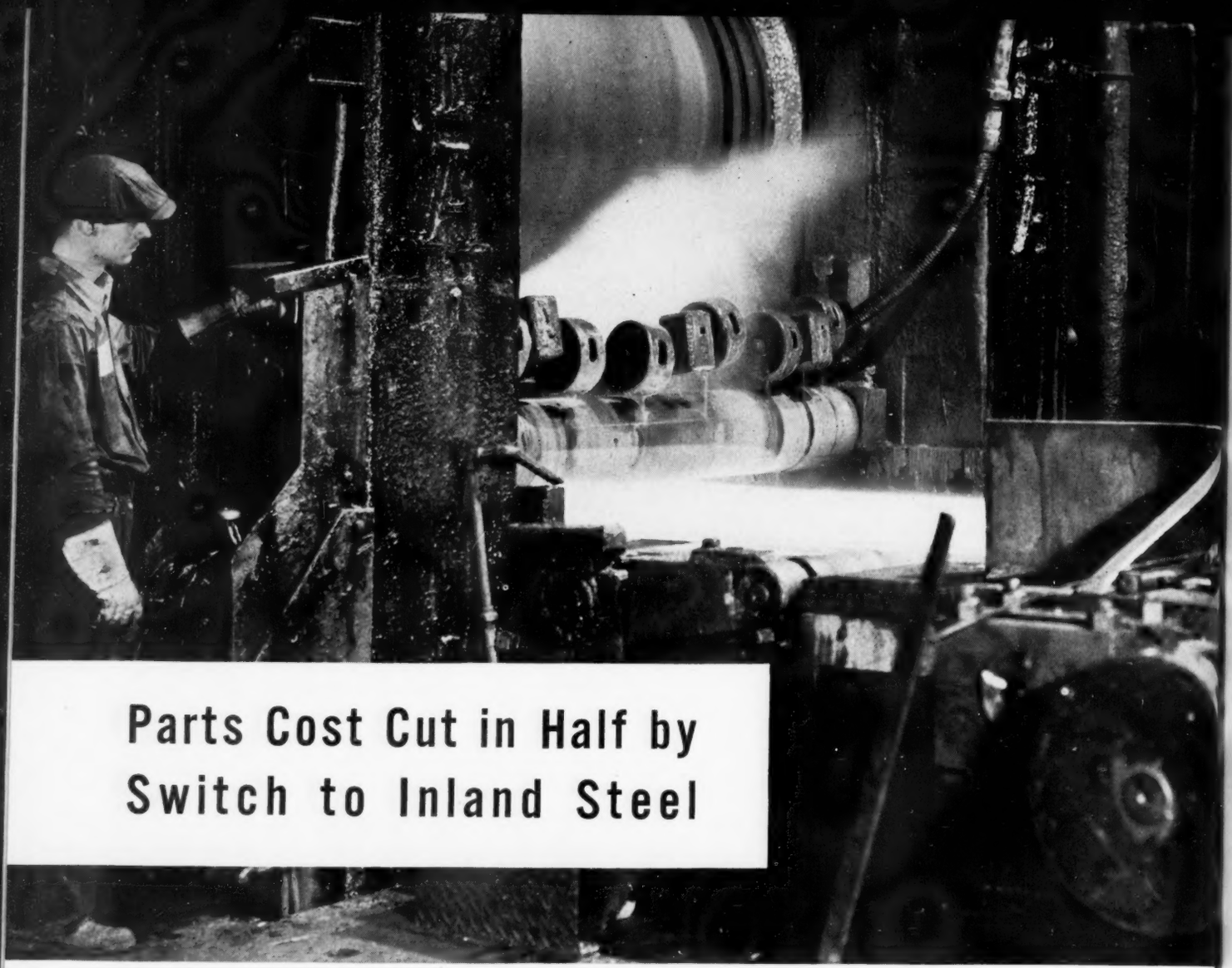
In 1929 the first Western metals congress and exposition was held at Los Angeles. It proved so successful that a second congress and show were conducted in San Francisco two years later. After a lapse of seven years the stage now is set (p. 38) at Los Angeles for the third Western metal congress and exposition, March 21-25. Co-operating with the chief sponsor, the American Society for Metals, are the western sections of 17 national technical societies. Comprehensive programs have been arranged by the American Society for Metals, the American Welding society and the American Society of Mechanical Engineers; 125 companies will exhibit their products. Held in a district where industry is making rapid strides, the congress and show should attract large attendance.

• • •

Powder Metallurgy

While reserves of high-grade iron ores in the United States are regarded as sufficient to meet our demands over the next 25 years, serious attention has been devoted here to the economical use of low-grade ores. Of widespread interest, therefore, is the practice at Scunthorpe, England, (p. 48) where ore containing less than 25 per cent iron is used effectively. . . . Uniformity and corrosion protection for metal finishes are assured by adequate tests some of which (p. 56) have been developed only recently. . . . Powder metallurgy (p. 45) is finding many new uses in industry. Wire lamp filaments, bearings, thermostatic elements, magnets, welding electrodes, electrical cores and cutting tools are being made of metallic powders under pressures as high as 50 tons per square inch.

E. L. Shaner



Parts Cost Cut in Half by Switch to Inland Steel

Have You Recently Checked Materials Used In Your Plant?

It's preserving a constant lookout for small wastes that keeps manufacturing costs low. Those wastes creep unseen into cost records . . . then grow and multiply into substantial losses over a year's time.

For example, a manufacturer of vehicle bodies was using an expensive non-ferrous metal for a difficult, small circular stamping.

Inland Deep Drawing Tin Plate proved just as satisfactory for the purpose and made a big saving in material cost.

Inland field men and metallurgists are constantly devoting their time to making savings in the fabrication and uses of steel. You can utilize their efforts in the cost-checking procedure of your plant without cost or obligation. Just call your nearest Inland office.

And Inland Mills are able to follow through! The close cooperation between Inland field men and mill men quickly and definitely adjusts today's most modern steelmaking facilities to each customer's individual requirements. Photo shows Roughing Stand in 76" Inland Hot Strip Mill.

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What of the Railroads? Deferred Steel Purchases Now 7,500,000 Tons

■ HOW MUCH steel will the railroads buy in the next few years? This question has been one of considerable interest to the steel industry ever since the request for higher freight rates was presented to the interstate commerce commission.

Unfortunately, there can be no definite answer. Testimony by railroad executives at the rate hearing in Washington late last year indicated probable purchases of as much as 100,000 freight cars annually for the next 20 years and 2000 locomotives in each of the next several years. These and other figures were based on estimated needs of the roads.

There is a sharp difference, however, between the amount of equipment the railroads would like to buy and the amount they feel they are financially able to acquire.

It seems best, therefore, to attempt to determine what is the potential market for steel products in the form of rails, cars, locomotives, etc., and to leave for speculation the tonnages that probably will be bought.

It is agreed that the carriers are badly in need of more equipment, partly to enlarge existing facilities and partly to replace old units. Requirements vary among different roads. How much is needed?

If we take figures for the past seven years we find that because the railroads have scrapped more equipment than they have built, and have abandoned more trackage than has been laid, there are 550,000 less freight cars, 12,000 less passenger cars, 12,000 less locomotives and 10,000 less miles of line than were in existence in 1930.

This reduction in facilities worked no hardship on the railroads during the depression, for the reason that freight traffic declined faster than did the amount of available rolling stock. Car loadings in the five years 1931-1935 averaged 40 per cent less than in 1925-1929, but the number of freight cars on hand declined only 25 per cent.

1930 Status No Criterion

It does not necessarily follow that if they were able to do so the railroads would return their equipment to the 1930 status as regards number of cars and locomotives.

Freight traffic has a long grade to climb before it will reach the volume of the 1920's. Some business probably has been lost permanently to other forms of transportation.

Furthermore, developments in locomotive and car design make it possible for modern equipment to haul more freight in less time than could be accomplished by older units, hence there is no early need for as many carrying and power units as were available before the last depression.

If railroad purchases since 1930 are compared with those of several years prior to 1930 and allowance is made for the reduced wear and tear on rails and equipment during the period of reduced traffic, some measure of the amount of deferred maintenance may be ascertained.

Considering the record of ten of the country's leading railroads, figures show that in the years 1927 through 1930 these roads laid a total of 4460 miles of rails annually. Business was good during that period, hence rail replacements may be considered to have represented what was actually necessary to keep roadbeds in normal condition. In the years 1931 through 1935, these same roads laid an average of only 1080 miles of new rails annually.

Since rails were wearing out less rapidly during the depression

■ Ralph Budd president of the Burlington (left); Carroll Burton, vice president, and G. C. Kimball, executive vice president, both of Carnegie-Illinois Steel Corp., pause to inspect miniature trains at a recent railroad appliances exhibit in Chicago

period, however, there was not the necessity of continuing rail installations at the 4460-mile annual rate of pre-depression years.

A rough figure of the amount of rails that should have been laid may be obtained by comparing the traffic density of the two periods in question. Tons hauled per mile of main line track in 1931-1935 by these ten roads averaged only about 63 per cent of the traffic density in 1927-1930. Assuming that rail replacement requirements were only 63 per cent of those of 1927-1930, this gives an indicated yearly need of 2810 miles.

Since actual installations averaged only 1080 miles, the apparent shortage was 1730 miles, or nearly 300,000 gross tons annually on the basis of 112-pound rails. For the five years the total deficiency was 1,500,000 gross tons.

The ten railroads referred to constitute about 40 per cent of the country's total mileage, hence the aggregate potential rail market resulting from deferred purchases of recent years appears to be 3,750,000 gross tons.

A large deficiency also has accumulated in freight car and locomotive purchases. From 1927 through 1930, Class I railroads of the United States installed an average of 78,046 freight cars yearly. This includes new and used units purchased, units rebuilt and units leased from other companies. From 1931 through 1935, installations averaged only 15,945 cars yearly.

Applying the 63 per cent factor again in this case (although there is a definite deterioration of cars whether idle or in service) gives a total of postponed car building of 165,115 units. Installations increased sharply in 1936 and 1937 but were insufficient to reduce the deficiency.

The desirability of replacing old cars with modern units is more pressing today than it was before the depression for the reason that the lighter, but equally as strong cars now available demonstrate a definite saving in operation costs. Similar savings were not available in 1927 or 1928 because the superiority of new cars over units to be discarded was less marked in those days.

Locomotive Need More Urgent

Using the same method as above in figuring the lag in locomotive buying gives an indicated shortage of 2000 units. The need for installing new locomotives is more pressing than that for the acquisition of modern freight carriers because of the marked improvement in operating efficiency resulting from locomotive design during recent years. This is noticeable in the steady reduction in pounds of fuel required to haul a given amount of freight one mile. Since 1922 this reduction has been more than 25 per cent. Consequently, the railroads likely would buy many more than 2000 locomotives if funds were available.

As an example of the saving accruing through use of modern power in switching service alone, the Chicago, Rock Island & Pacific railroad recently reported that the ten diesel locomotives it had rented almost a year ago had saved about $1000 a month after payment of rental charges. The road is leasing ten additional units, rental payments on which will permit their outright purchase after seven years at $1 each.

On the basis of the foregoing figures, there accumulated up to 1936 a potential market for about 3,750,000 gross tons of rails, 165,000 freight cars and 2000 locomotives. Reduced to a tonnage basis, and considering the lighter weight of new equipment, this represents approximately 7,500,000 gross tons of rolled steel, forgings and castings.

This deferred buying may be figured in another manner. STEEL's annual compilation of rolled steel distribution shows that from 1927 through 1930 the railroads bought an average of 4,875,000 gross tons annually for track work and equipment building. In addition, purchases for bridges and other structures amounted to more than 500,000 tons yearly.

During the next five years steel consumption for tracks and equipment averaged only about 1,500,000 tons. With traffic during that period 63 per cent of the pre-depression rate, indicated requirements actually were slightly more than 3,000,000 tons. Postponed purchases of 1,500,000 tons for each of the five years resulted in a total deficiency of 7,500,000 tons.

Rolled Steel Consumption Up

In 1936, railroads consumed about 3,000,000 tons of rolled steel for production of track material and equipment, while last year the figure was closer to 4,000,000 tons.

On the basis of traffic conditions as related to 1927-1930 purchases, steel consumption by the carriers the past two years failed to represent normal replacements, let alone a part of the deferred buying that accumulated the five previous years.

The figure of 7,500,000 tons of potential steel business, in addition to normal annual needs of several million tons, from the railroads, therefore may be considered conservative.

Theoretical as this analysis may be, it points to the accuracy of the contention that the late departed business recovery expired before it had completed its job. Deferred maintenance that piled up during the depression still exists not only among the railroads but also among other industries, and will provide strong support to the next upturn in general activity.

Diesel-Electric Locomotive Powered by Five Engines

■ **Chances of a complete mechanical breakdown are virtually eliminated by the multiple-engine design of this new diesel-electric switching locomotive built by the Davenport-Besler Corp., Davenport, Iowa. Power plant consists of main engines of the V-8 type, developing a total of 720 horsepower, and a 40-horsepower auxiliary engine, all built by Caterpillar Tractor Co., Peoria, Ill. On demonstration on the Rock Island Lines, the locomotive has top speed of 40 miles an hour, can handle 50 to 100 loaded cars**

PROPOSED RATE ADVANCE ON IRON ORE PROTESTED

Protest against the proposed 15 per cent increase in iron ore freight rates, as part of the blanket increase asked by railroads, is contained in a brief to the interstate

commerce commission by the Lake Superior Iron Ore association, Cleveland.

The association, representing independent producers and shippers of iron ore, contends:

Carriers handling 81.63 per cent of this traffic (iron ore) have no need of additional revenues;

The traffic is isolated, employing only short isolated carrier lines or divisions; is tremendously profitable to all such lines or divisions; and should not be further burdened with the losses which certain of the carriers, handling only small tonnages of iron ore, are sustaining on the remainder of their great systems;

Such rates are today unreasonably high;

The existing level of such rates constitutes discrimination against iron ore.

Increased freight rates would work a particular hardship on the low-grade ore producers and those who beneficiate ore, assert the producers. This would tend to concentrate mining in the richer mines and thus more quickly deplete the supply of high-grade ore.

Show Data To Prove Housing Peak Passed

■ That housing construction never again will reach the levels of the last decade is the conclusion reached in a study of the subject by Allen W. Rucker and N. W. Pickering, business economists. The study deals with the housing program versus rent and the population trends and is being distributed by Farrel-Birmingham Inc., Ansonia, Conn.

The authors claim the assumed normal of 2.5 to 3 billion dollars of housing annually is not a normal but simply the abnormal peak that comes only once in the lifetime of a nation. They hold the opinion that the federal housing program ignores three fundamental factors, the rise of building costs relative to rents, the rapidly declining birth rate, and distribution of child population in areas least able to afford new homes.

Worker Testifies He, Not Company, Put Up Poster

■ George R. Cathers, a nonunion employe at Cambria works of Bethlehem Steel Co., testified before a national labor relations board hearing that he had hung a poster, purportedly antiunion, in the plant. Labor board attorneys had attempted to show the company was responsible for putting up the poster, issued by the Johnstown Citizens' committee, and thus was guilty of unfair labor practice.

Cathers said he found his lunch wrapped by his wife in a newspaper which contained a full-page advertisement by the Citizens' committee.

"It said a man had a constitutional right to strike and also a constitutional right to work," the witness continued. "I was in sympathy with that. It just suited me all right, so I hung it up."

He testified no company official had anything to do with putting up the poster.

Hot Dip Galvanizers To Issue More Specifications

■ Specifications for a number of additional galvanized products will be issued shortly by the American Hot Dip Galvanizers' association, and existing specifications will be extended, it was announced at the association's annual meeting Feb. 24, in Pittsburgh.

All officers were re-elected, including T. M. Gregory, Hanlon-Gregory Galvanizing Co., Pittsburgh, president; I. M. Hermann, Acme Galvanizing Inc., Milwaukee, and Miss D. R. Pearlman, Enterprise Galvanizing Co., Philadelphia, vice-presidents; and Stuart J. Swensson, 903 American Bank building, Pittsburgh, secretary-treasurer.

Directors re-elected include the officers and F. P. Auxer, National Telephone Supply Co., Cleveland; A. J. Blaeser, Joslyn Mfg. & Supply Co., Chicago; W. J. Gregory, Thomas Gregory Galvanizing Works, Maspeth, N. Y.; and Phelps Ingersoll, Wilcox, Crittenden & Co., Middletown, Conn.

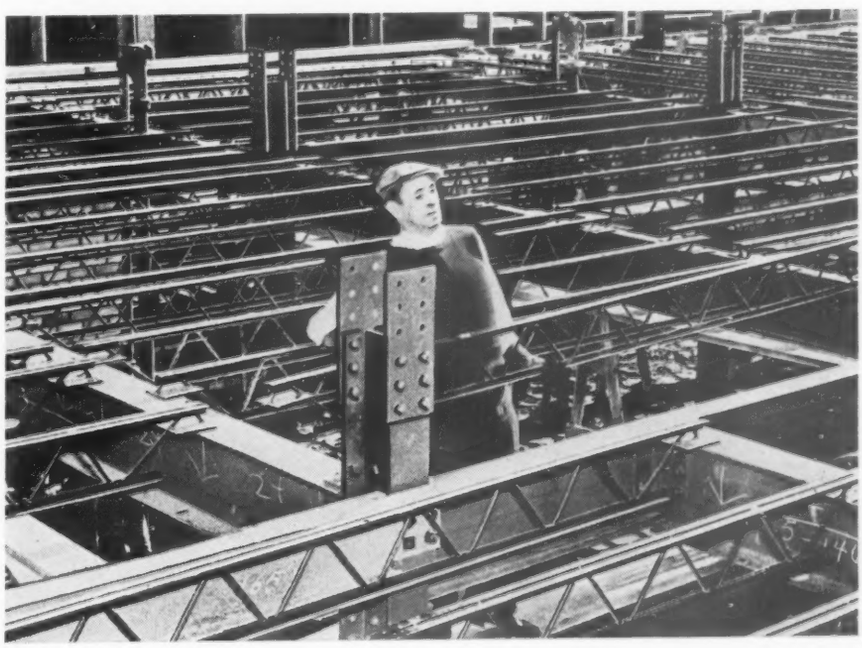
Schedule Hearings on Scrap Exports Bill

■ The senate military affairs committee has started arranging a calendar of appearances for hearings beginning March 8 on bill to license scrap exports.

Now on the calendar are: Benjamin Schwartz, director general, Institute of Scrap Iron and Steel; Charles M. Haskins, National Association of Waste Materials Dealers, New York; Dr. Jacques M. Magnite, New York; John Calandrillo, Waste Material Sorters union, New York. The senate committee had not yet heard from the independent steel committee on scrap.

J. Carson Adkerson, American Manganese Producers' association, and Senator John E. Miller (Arkansas) will be heard on manganese.

New Building Code Opens a Market for Steel



■ **Increased use of light open-web steel joists in building construction is the first tangible result of the new building code in New York. These members may now be used in concrete slab floor construction and with metal lath and plaster ceilings in buildings up to nine stories or under 100 feet high. This class of building is potentially large, requiring thousands of tons of such steel. They may be handled by one workman. Photograph shows the placing of joists for the 6-story Beekman estate apartment house. Wide World photo**

January Exports Off 33.5 Per Cent

■ EXPORTS of steel and iron products from the United States in January, excluding scrap, were 229,565 gross tons, valued at $14,679,634, a decline of 33.5 per cent from the December total of 306,647 tons, valued at $20,743,541, according to the department of commerce. The January total compares with an average monthly figure of 289,000 tons in 1937. It was almost double the export volume of January, 1937.

Decrease in January was practically all accounted for by smaller shipments of tin plate, steel ingots and rails. Steel ingots showed the sharpest loss, 27,000 tons. Rails were next with 15,500 tons less, and tin plate exports fell off 12,000 tons.

Ingots Lead Exports

Steel ingots led January exports with 37,600 tons, of which 19,600 tons went to the United Kingdom and 16,500 tons to Japan. Pig iron was second with exports of 36,000 tons and again the United Kingdom led with 18,600 tons, Japan second with 14,900 tons. Tin plate shipments were 19,000 tons, widely distributed.

Scrap shipments totaled 356,537 tons, valued at $6,065,852, compared with 319,771 tons valued at $5,701,466 tons in December. This tonnage exceeded the monthly average of 333,000 tons for 1937. European markets took most of the scrap, the United Kingdom accounting for 128,100 tons, the Netherlands 58,200 tons and Italy 47,600 tons. Japan's scrap shipments were 31,000 tons, compared with 9000 tons in December.

UNITED STATES EXPORTS OF IRON AND STEEL PRODUCTS

Gross Tons

Articles	Jan. 1938	Dec. 1937	Jan. 1937
Pig iron	35,997	36,545	13,329
Ferromanganese and spiegeleisen	.....	39	75
Other ferroalloys	.....	362	93
Ingots, blooms, etc.:			
Not containing alloy	37,551	64,183	1,790
Alloy incl. stainless	88	53	44
*Steel bars, cold finished	219	.....	.....
Bars, iron	349	65	90
Bars, concrete	1,761	2,280	891
Other steel bars:			
Not containing alloy	16,383	15,168	4,385
Stainless steel	9	29	47
Alloy, not stainless	545	585	335
*Welding rods, electric	72	.....	.....
Wire rods	2,488	2,811	3,279
Boiler plate	287	790	217
Other plates, not fab.:			
Not containing alloy	26,038	21,412	7,074
Stainless steel	10	10	2
Alloy, not stainless	288	64	13
Skelp, iron or steel	621	624	1,531
Sheets, galv. iron	176	752	994
Sheets, galv. steel	3,938	5,863	5,496
Sheets, "black" steel:			
Not containing alloy	16,570	20,749	13,296
Stainless steel	79	298	46
Alloy, not stainless	871	81	14
Sheets, black iron	649	397	704
Strip steel, cold-rolled:			
Not containing alloy	2,232	4,537	2,276
Stainless steel	98	52	39
Alloy, not stainless	6	42	29
Strip steel, hot-rolled:			
Not containing alloy	3,612	3,818	5,934
Stainless steel	6	3	25
Alloy, not stainless	9	1	107
Tin plate, taggers' tin	19,073	31,364	25,232
Terne plate	1,000	517	641
Tanks, except lined	5,083	12,547	563
Shapes, not fabricated	9,738	8,060	4,512
Shapes, fabricated	4,854	3,664	1,520
Plates, fabricated	830	3,335	127
Metal lath	75	70	103
Frames and sashes	65	78	73
Sheet piling	843	657	847
Rails, 60 lbs.	12,703	27,598	3,835
Rails, under 60 lbs.	4	263	721
Rails, relaying	467	735	1,518
Rail fastenings	922	1,748	286
Switches, frogs, etc.	217	353	118
Railroad spikes	178	167	234
R. R. bolts, nuts, etc.	106	73	58
Boiler tubes, seamless	410	1,027	734
Boiler tubes, welded	2	45	24
Pipe:			
Seamls. cas'g & oil-line	4,484	6,719	3,151
Do. welded	1,067	484	786
Smls. black, ex. csg.	393	854	1,263
Pipe fittings:			
Malleable iron screwed	208	266	283
Cast iron screwed	168	138	157
Pipe and fittings for:			
Cast iron pressure	568	1,302	1,801
Cast iron soil	847	938	613
Pipe, welded:			
Black steel	1,081	1,330	1,419
Black wrought iron	231	1,444	160
Galvanized steel	852	1,570	2,953
Galv. wrought iron	194	244	11
Pipe and fittings:			
Riveted iron or steel	840	193	47
Wire:			
Plain iron or steel	1,698	1,801	2,547
Galvanized	1,861	1,382	1,653
Barbed	823	1,726	3,344
Woven wire fencing	142	261	179
Woven wire screen cloth:			
Insect	15	17	23
Other	54	89	103
Wire rope	306	529	215
Wire strand	88	91	36
Card clothing	1	1	1
Other wire	502	520	539
Wire nails	825	1,678	1,087
Horseshoe nails	114	103	73
Tacks	10	33	23
Other nails, staples	145	327	203
Bolts, etc.	700	744	698
Castings:			
Gray iron, semisteel	260	208	508
Malleable iron	253	253	315
Steel, not alloy	67	223	112
Alloy, incl. stainless	29	144	137
Car wheels, tires, axles	2,561	6,351	628
Horseshoes and calks	2	5	2
Forgings, n. e. s.:			
Not containing alloy	516	646	338
Alloy, incl. stainless	59	119	134
Total (gross tons)	229,565	306,647	128,843
Scrap, iron and steel	355,781	319,016	68,884
Scrap, tin plate	514	382	437
Tin plate, circles, strips, cobbles, etc.	96	222	852
Waste-waste tin plate	146	151	2,676
Total scrap (gr. tons)	356,537	319,771	72,849
GRAND TOTAL	586,102	626,418	201,692
Iron ore (gross tons)	115	166	80

*No distinction prior to 1938.

Radio Station Erects 750-Foot Steel Antenna

■ Radio station WGN is erecting a 750-foot single vertical radiator antenna at Itasca, Ill. Main mast members will be completely welded, and will consist of solid round and angle shapes rolled by Republic Steel Corp. and fabricated at the Youngstown, O., plant of the Truscon Steel Co., a subsidiary.

Average material thickness will be greater than that used in ordinary bridge construction.

Armament Aids Canadian Steel

■ STEELMAKING in Canada is relatively in better position than in the United States, production being close to capacity, continuing the upward movement which gained steadily since the low point in 1932. Considerable of this increase results from Great Britain's rearmament program.

The British government a year ago made a survey of possibilities of Canada as a source of iron ore, as supplies from Spain were interrupted by the war. Arrangements were made for shipments from the Wabana mines in Newfoundland, owned by the Dominion Steel & Coal Corp. Ltd., Montreal, and Nova Scotia Steel & Coal Co. Ltd., Sydney, N. S. These mines have been worked all winter and ore stored in readiness for shipment at the opening of navigation this spring. Shipments from this source in 1937 are estimated at 1,700,000 tons, the largest in several years.

Steel Companies Expanded

In view of Great Britain's need for steel, Canadian companies started to expand. Steel Co. of Canada Ltd., Hamilton, Ont., has completed a 150-ton open hearth and is building a blooming mill, which will be placed in operation in March. The same company is understood to be planning a continuous sheet mill.

Dominion Foundries & Steel Co., Hamilton, Ont., has completed a tin plate mill costing about $2,000,000, with capacity to supply about 30 per cent of the Dominion's requirements.

This company in 1937 bought four Canadian subsidiaries of the United States Steel Corp., and also Graham Nail & Wire Products Co. Ltd., Toronto. The subsidiaries are: Canadian Steel Corp. Ltd., Canadian Bridge Co. Ltd., Essex Terminal Railway Co. and Canadian Steel Lands Ltd. Canadian Bridge has been in continuous operation. Additional equipment is being installed in plants of the other companies.

U. S. Steel had provided capacity for drawing 15,000 tons of plain wire, 9000 tons of galvanized wire, 1800 tons of barbed wire annually and some capacity for coating tin and terne plate and galvanized sheets.

Algoma Steel Corp. Ltd., Sault Ste. Marie, Ont., is increasing its open-hearth capacity materially, and making other improvements, to cost about $10,000.

This company plans development of the siderite iron ore deposits in the Michipicoten area in Ontario. British capital to the extent of $1,-

500,000 is being provided for this.

Other metalworking interests have felt the impetus of British rearmament activity and this has brought added demand for steel. Railway equipment companies are producing aircraft for military and civil use, and National Steel Car Corp. Ltd., Hamilton, Ont., also is producing shell parts. Canadian Vickers Ltd., Montreal, already equipped for armament production, has added to its facilities.

The steady upward movement in steel and pig iron production in Canada is shown in the following table. Ingot production in 1937 was the highest since 1918 and pig iron output largest since 1929.

Year	Steel	Pig iron
1932	335,000	160,000
1933	403,000	258,000
1934	741,000	438,000
1935	915,000	655,000
1936	1,115,779	678,231
1937	1,401,011	895,855

Coffin Awards Bestowed On 40 G. E. Employes

■ Forty of General Electric Co.'s 70,000 employes last week were given Coffin awards for outstanding contributions to the electrical industry. The awards, a framed certificate and a cash honorarium, have been granted to 492 employes since the Charles A. Coffin foundation was established in 1922, to perpetuate the memory of the company's founder.

This year's awards covered a wide variety of contributions, went to 19 factory men, 15 engineers, three sales and three administrative employes.

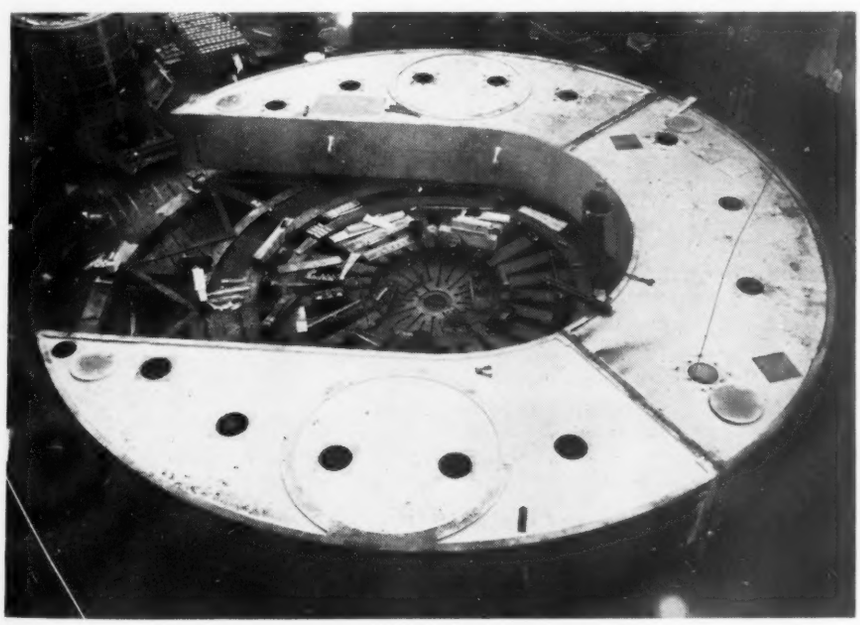
District Steel Rates

Percentage of Open-Hearth Ingot Capacity Engaged in Leading Districts

	Week ended Feb. 26	Change	Same week 1937	Same week 1936
Pittsburgh	28	— 1	87	38
Chicago	24.5	None	80.5	62
Eastern Pa.	30	None	56	37.5
Youngstown	29	None	81.5	63
Wheeling	38	— 6	94	78
Cleveland	31	— 2	79.5	66.5
Buffalo	21	None	86	42
Birmingham	61	None	77	66
New England	27	None	97	72
Cincinnati	35	+13	64	76
St. Louis	28	None	82	†
Detroit	43	— 5	97	94
Average	30.5	— 0.5	84	54.5

†Not reported.

500-Ton Telescope To Spring Huge Bearing to Contour



■ Machining this massive bearing slightly out-of-round so that the burden of the 500-ton, 200-inch telescope to be erected on Mt. Palomar, California, will spring it to a true circle is the task engineers are performing at Westinghouse Electric & Mfg. Co.'s East Pittsburgh works. Allowance of 0.005-inch from a true circular contour is the limit set. The bearing is believed to be the largest ever made, 46 feet in diameter and 53 inches thick, weighs 158 tons. It will be given a glass-smooth surface which will move on two steel oil pads through which oil will be forced at 250 pounds to the square inch. Big as a six-story building, telescope can be moved on this bearing by a 0.165-horsepower motor.

PRODUCTION

■ OPERATING schedules vary little as steelmakers have reached a close balance with buying. Various changes have resulted in loss of one-half point, to 30.5 per cent, with indications of only slight change this week.

Central eastern seaboard—Steady at 30 per cent with tendency upward.

Chicago—Remained at 24.5 per cent despite the second upturn in operations by a leading producer. Some increase is scheduled for this week.

Pittsburgh—Down 1 point to 28 per cent because of temporary adjustment.

Wheeling—Declined 6 points to 38 per cent with no indication of a change this week.

Cincinnati—Advanced 13 points to 35 per cent. One producer is scheduling part-week operation to approximate current sheet buying.

Birmingham, Ala.—For the third week production was at 61 per cent, with expectation of the same rate this week.

St. Louis—Output continued at 28 per cent for the second week.

Detroit—Eased 5 points to 43 per cent, nine of 21 furnaces operating the full week.

Cleveland — Loss of one open hearth lowered the rate 2 points to 31 per cent, which will probably be the rate this week.

Buffalo—Continued at 21 per cent.

New England—Held at 27 per cent with indications of little change in early March.

Youngstown—Slight changes in operations balanced each other and held the rate at 29 per cent. An advance of at least 1 point is expected for the first week in March. Active open hearths now number 29.

Lead Coating Process Facilitates Cold Drawing

■ A lead coating process for cold drawing operations, originated in Europe, is being introduced in this country by Conrad Wolff, metallurgical consultant, Box 448, Newark, N. J.

Tubes, bars, etc. treated by this process may be cold drawn five or six times without intermediary annealing and pickling, it is claimed. Work is immersed in a cold solution of mercury salt for one minute or less. Steel being treated then goes into a cold solution of lead salt for 5 to 10 minutes. The soft lead coat produced is not attached directly to the surface of the steel but is separated by a film of mercury.

Institute Tells Why Tariff Favors Should Not Be Given United Kingdom

■ ARGUMENTS against tariff concessions on iron and steel products to the United Kingdom under the proposed reciprocal trade agreement are contained in a brief filed by the American Iron and Steel institute with the committee for reciprocity information.

Higher wages paid by the American steel producers already give foreign producers an advantage, the document points out. Other arguments: Imports are unnecessary because American steelmaking capacity is adequate; any concession granted the United Kingdom would extend to other countries having most-favored-nation treaties; even small imports to the seaboard would affect the competitive status of all producers.

Submitted is a summary of average hourly earnings of foreign steelworkers as compared with American rates:

Country	Hourly Earnings	Year
United States	67.1	1936
United States	82.0	1937
Belgium	16.0	1936
France	37.0	1935
Great Britain	34.5	1935
Italy	21.0	1935
Japan	8.0	1936
Poland	22.5	1936
Sweden	29.0	1935

Another table shows the average number of man-hours required per gross ton of steel products made in representative United States plants operating at 55 to 60 per cent of capacity:

Product	Man-Hrs. Required
Average, all products	53.00
Billets and slabs	29.03
Structural shapes, in rolled form, not fabricated	33.91
Wire rods	35.60
Plates, sheared and universal	36.54
Concrete reinforcing bars	36.97
Standard rails, incl. fastenings	38.54
Bar steel (merchant steel bars, light shapes, etc.)	39.35
Hoops and bands	42.00
Wire, drawn	51.19
Sheets, all grades	58.19
Wire fencing	60.37
Wire nails	61.61
Pipe and tubing	62.72
Steel car wheels (rolled)	63.97
Railroad axles	64.07
Wire, flat, incl. steel in strips	67.00
Tin plate—terne plate	80.63

"The point which we wish to bring to your attention in this connection is that iron and steel producers in the United Kingdom and in other foreign countries already have a very substantial advantage in one of the chief items of cost as compared with producers in the United States, because of the much lower level of wages paid to labor in those countries," reads the brief.

"The average hourly earnings of American iron and steelworkers in the year 1937 amounted to 82 cents, which figure, according to our latest available information, is more than twice as much as the average hourly rate in the iron and steel industry in Great Britain, and nearly three times as much as the general foreign average.

"Any further tariff concessions on iron and steel products granted under the proposed agreement with the United Kingdom will, of course, serve only to give foreign producers an added advantage in competing with domestic producers in the markets of this country.

Productive Capacity Adequate

"It must also be emphasized that any such advantage will accrue not only to producers whose mills are located in the United Kingdom and in the British colonial empire, but also to producers in all other foreign countries with which commercial treaties of the United States provide for most-favored-nation treatment."

The brief attacks the argument that because iron and steel imports are equal to only a fraction of total domestic production any action relative to imports must have only a correspondingly small competitive effect upon the domestic producer. While the sale or use of imports is largely confined to seaboard areas, the ultimate competitive effect may be widespread, because distributors or users of such products who are located along the seaboard are in direct competition with inland distributors or users. Competitive advantage of the seaboard consumer may render his inland competitor unable to meet that competition, the brief points out.

"Furthermore, the seaboard areas, which are directly exposed to competition from imports of iron and steel products, are among the principal steel markets of this country. Practically all iron and steel mills, both seaboard and inland, depend at least in part on those seaboard markets as outlets for their products.

"We believe that after all there is no real economic necessity or reason for imports of iron and steel products into the United States, either from the United Kingdom or from any other country, because the productive capacity of the iron and steel industry in the United States is now, and has long been, ample to supply the demand."

While urging that no concessions be granted, the institute's brief, signed by Walter S. Tower, executive secretary, concludes with the recommendation that if concessions are to be made, a consistent policy be followed with respect to many of the imported products used by the iron and steel industry.

This country's imports of iron and

Steel Tiers Convert Barge Into Auto Carrier

■ **A growing trend to utilize inland waterway transportation for finished products is illustrated by the adaptation of this coal barge as a motorcar carrier. The first, it is reported, specifically redesigned for this purpose, it has room for 81 automobiles on its three steel tiers. Center sections of top and middle tier are removed for loading, cars being lifted onto runways by a crane equipped with special grabhooks. Dravo Corp., Pittsburgh, has just built two such carriers for Union Barge Lines**

steel products in 1937 totaled 533,160 gross tons; exports, 7,567,884 tons. For details as to products see STEEL, Feb. 7, p. 35.

Also protesting tariff concessions is a committee representing the tool and fine steel industry. To the committee for reciprocity information this group reported: Domestic capacity is sufficient (industry has operated far below capacity for the past six years, only 1937 business being encouraging); tariff cuts would encourage imports and further displace American labor; even at present rates, substantial quantities of tool and fine steels are being imported at ominously low rates.

Committee includes: A. T. Galbraith, vice president, Crucible Steel Co. of America; Floyd Rose, vice president, Vanadium-Alloys Steel Co.; J. Heber Parker, vice president, Carpenter Steel Co.

FINANCIAL

■ REPUBLIC STEEL CORP.'S board of directors declared the regular dividend of $1.50 per share on the 6 per cent cumulative convertible prior preference stock, series A, payable April 1 to record of March 14. No action was taken on the 6 per cent cumulative convertible preferred stock.

♦

M. A. Hanna Co.'s consolidated report for the year ended Dec. 31 shows net profit of $3,048,462. This is equal, after dividend requirements on 129,621 shares of $5 preferred stock, to $2.36 a share on 1,016,961 common shares. This compares with net profit of $2,834,336, equal to $2.14 a common share in 1936.

♦

Despite a net loss of $1,773,591 in the final quarter, Jones & Laughlin Steel Corp., Pittsburgh, reports net profit of $4,788,799 for the full year 1937. This compares with $4,129,600 in 1936. Preferred accumulations at the end of the year were $28 a share.

♦

Westinghouse Electric & Mfg. Co. reports orders booked for 1937 were $229,540,061, compared with $182,521,304 in 1936, an increase of 25 per cent. This exceeded any year except 1929, when the orders were $240,220,555.

Net income amounted to $20,126,408 compared with $15,099,291 in 1936, an increase of 33 per cent.

At the beginning of 1938 the company had a large backlog of orders, amounting to $60,298,087, an increase of 24 per cent over Dec. 31, 1936.

♦

Midvale Co., Nicetown, Pa., has declared a dividend of 75 cents a share, payable April 2 to stock of record March 26. The same amount was paid April 3, last year. Net profits for the fiscal year ending Dec. 31, 1937 were $1,341,816 against $1,266,168 in the previous year.

♦

Wellman Engineering Co., Cleveland, reports net profit of $97,108 for the 12 months ending Dec. 31, 1937, the best year since 1931. No comparable figures for 1936 are available. Order backlog valued at $497,000 carried at the close of 1937 was the largest since 1930.

Consumers' Net Earnings in 1937 Up 24 Per Cent

■ NET earnings of 63 companies among equipment manufacturers and other leading consumers of iron and steel for 1937 average 24 per cent higher than for the same companies in 1936. STEEL's tabulations, Feb. 14, page 23, included 33 companies, while the subjoined table lists 30. All figures are net earnings except where asterisk denotes loss.

	1937	1936
Yellow Truck & Coach Mfg. Co., Pontiac, Mich.	$3,571,669	$5,089,024
Mullins Mfg. Co., Salem, O.	534,072	525,225
Iron Fireman Mfg. Co., Portland, Oreg.	711,460	774,787
U. S. Hoffman Machinery Corp., New York	489,104	447,980
Minneapolis-Honeywell Regulator Co., Minneapolis	2,929,249	3,082,361
Hoskins Mfg. Co., Detroit	635,064	575,348
Square D Co., Detroit	1,062,773	982,022
S. R. Dresser Mfg. Co., Bradford, Pa.	394,505	392,735
Oliver Farm Equipment Co., Chicago	2,182,763	1,153,640
Van Norman Machine Tool Co., Springfield, Mass.	345,019	287,255
Youngstown Steel Door Co., Youngstown, O.	2,209,500	1,252,559
Lamson & Sessions Co., Cleveland	638,402	220,508
McCord Radiator & Mfg. Co., Detroit	*20,845	132,417
Marion Steam Shovel Co., Marion, O.	338,191	68,789
White Motor Co., Cleveland	65,854	681,628
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.	20,126,408	15,099,291
Midland Steel Products Co., Cleveland	2,320,811	2,160,036
Baldwin Locomotive Works, Philadelphia	407,377	*2,163,950
Bliss & Laughlin, Inc., Harvey, Ill.	659,881	667,583
General Steel Castings Corp., Eddystone, Pa.	490,752	*2,131,780
Federal Screw Works Corp., Detroit	153,816	50,454
Muskegon Piston Ring Co., Muskegon, Mich.	403,386	339,802
Globe Steel Tubes Co., Milwaukee	281,323	86,000
Remington Arms Co. Inc., Bridgeport, Conn.	1,509,804	1,100,905
Chicago Railway Equipment Co., Chicago	681,342	405,855
Hayes Body Corp., Grand Rapids, Mich.	8,744	*51,804
Eureka Vacuum Cleaner Co., Detroit	20,326	248,329
Upson Walton Co., Cleveland	169,002	126,569
Air-Way Electric Appliance Corp., Toledo, O.	*412,300	*173,300
International Harvester Co., Chicago	32,493,000	29,760,000

LABOR

NEW SWOC CONTRACTS ADOPT LIMITING CLAUSE

■ JONES & LAUGHLIN STEEL CORP., Pittsburgh, last week signed an agreement with the Steel Workers Organizing committee, renewing provisions of the 1937 contract.

Only major change is that either party may call for reopening of negotiations on ten days' notice and if an agreement is not reached within 20 days, the contract shall be void. This is similar to that incorporated in the contract between SWOC and United States Steel Corp. subsidiaries.

The Jones & Laughlin contract recognizes SWOC as the exclusive bargaining agent for its employes, normally about 25,000.

General Electric Co., Schenectady, N. Y., signed an agreement with the United Electrical, Radio and Machine Workers, a CIO affiliate, recognizing the union as the exclusive bargaining agent in six plants. Employes of other plants will be offered the same contract if the union is certified as sole bargaining agent for them by the national labor relations board, or by other means mutually satisfactory.

Bars Closed Shop

The agreement bars both a closed shop and company unions; provides a procedure for adjusting disputes; stipulates the use of impartial umpire; outlaws strikes and lockouts; and provides for use of company bulletin boards by the union.

Contract shall be in effect for one year and from year to year unless either party gives the other 90 days' written notice of cancellation. Either party may call a conference to propose modifications of the contract on 30 days' notice.

In Cleveland, SWOC Chairman Philip Murray assailed the "foolish economic policy of the administration" in recommending price and wage reductions prior to the recent renewal of the agreement with Steel corporation subsidiaries. Murray contended the CIO had prevented wholesale wage slashes by turning down a plan, blessed by the administration, to gear wages to steel production.

BAR IRON WAGE RATES UNCHANGED FOR MARCH

Bar mill wage settlement for March, agreed between the Western Bar Iron association and the Amalgamated Association of Iron, Steel and Tin Workers, is unchanged from the February rate. The base for boiling, bar and 12-inch mills is $2.45; for guide and 10-inch mills, $2.55.

MEN OF INDUSTRY

■ GEORGE H. BUCHER, executive vice president, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., and also president and general manager, of Westinghouse Electric International Co., has been elected president of the former company. He succeeds Frank A. Merrick, president since 1929, who has become vice chairman.

After graduating from Pratt institute, Brooklyn, N. Y., Mr. Bucher joined the Westinghouse organization as a graduate student in 1909. In 1911 he was transferred to the export department in New York; in 1920 was made assistant to general manager of the International company. A year later he became assistant general manager, which position he held until 1932 when he was promoted to vice president and general manager. In 1934 Mr. Bucher became president and general manager, and in 1936 was also elected executive vice president of Westinghouse Electric & Mfg. Co.

♦

R. C. Ingersoll, vice president, Borg-Warner Corp., Chicago, has been elected a director of the Transportation Association of America.

♦

William M. Bailey, president, William M. Bailey Co., Pittsburgh, and C. C. Clayton, secretary-treasurer, have been elected directors, Wellman Engineering Co., Cleveland.

♦

William E. England has been named executive engineer, American Bantam Car Co., Butler, Pa. He recently resigned as chief engineer, Willys-Overland Co., Toledo, O.

♦

J. K. FitzGerald, associated with the Niagara Machine & Tool Works, Buffalo, for many years as a sales engineer, has been named district sales manager at Cleveland where

J. K. FitzGerald

George H. Bucher

the company will open a new factory branch office March 1 in the Leader building.

♦

W. R. Spiller is now engaged in consulting work for the Erie Malleable Iron Co., Erie, Pa. He formerly was chief engineer, White Motor Co., Cleveland.

♦

John A. Coakley has been elected president, Automatic Sprinkler Corp. of America, Youngstown, O. He formerly was traffic manager of Carnegie-Illinois Steel Corp., Pittsburgh.

♦

F. L. Eberhardt, president and general manager, Gould & Eberhardt, Irvington, N. J., sailed last week to visit the Leipzig Trade Fair in Germany. He is accompanied by W. F. Zimmerman, chief engineer and works manager of the company.

♦

William D. Todd, former vice president, Jones & Laughlin Steel Corp., Pittsburgh, has been selected foreign representative of the Steel Export Association of America, with headquarters in London. He succeeds John O'Outwater.

♦

Porter B. Chase, president, Sesamee Lock Co., Hartford, Conn., has become president and treasurer of Bemis & Call Co., Springfield, Mass., in which he and Howard A. Lincoln have purchased a controlling interest. Mr. Lincoln has been made vice president and general manager.

Bemis & Call will manufacture and market all products of the Sesamee Co. in addition to its line of adjustable wrenches.

♦

James A. Farrell, former president, United States Steel Corp., New York, received the gold medal of the American-Irish Historical society Feb. 19 at the annual dinner of the society in New York. The medal is awarded annually to "the American citizen of Irish blood whose work is judged outstanding in his field."

♦

W. R. Ferguson, formerly with Owens-Illinois Glass Co.; A. J. Metzger, previously with Charles Taylor Sons Co., and M. S. Tarnopol, heretofore on the teaching staff of the department of ceramics at Pennsylvania State college, have recently joined the technical staff of Battelle Memorial institute, Columbus, O.

♦

A. E. Grapp has been re-elected president Despatch Oven Co., Minneapolis. Other officers re-elected at the company's annual meeting Feb. 1 include: H. L. Grapp, vice president and general manager; C. P. Doherty, vice president and production manager; G. C. Keyes, vice president and chief engineer; F. H. Faber, secretary and sales manager.

♦

J. A. Comstock has become associated with the Surface Combustion Corp., Toledo, O., as consulting metallurgist. He is a graduate in metallurgy from the University of Illinois. During the last four and a half years he served as metallurgist with the Illinois Tool Works, Chicago, and for nine years previous to that was with the Peoples Gas Light & Coke Co., Chicago, where he was engaged in research on the application of gas to industry.

♦

William C. Cowling has been elected vice president, Willys-Overland Motors Inc., Toledo, O. He was associated with Ford Motor Co. for 23 years, the last six years being general sales manager of that organization in charge of domestic and foreign sales. Nelson A. Beardsley continues as general sales manager of Willys-Overland, and Ralph J. Archer continues as vice president of Willys Export Corp., in charge of export sales.

♦

C. O. Drayton, for the past 12 years general sales manager, Graton

C. O. Drayton

& Knight Co., Worcester, Mass., has become general sales manager, American Screw Co., Providence, R. I. George H. Reama, recently supervisor of a training program for General Electric Co., has been named factory manager of the American company.

♦

Alfred J. Diefenderfer has been appointed superintendent of the new slabbing mill at Edgar Thomson works of Carnegie-Illinois Steel Corp., Braddock, Pa. He has worked in various plant operating capacities at the Farrell and Sharon, Pa., plants of the company since 1912 and has been assistant rolling superintendent at Farrell since 1929. Marlin C. Schwab succeeds Mr. Diefenderfer as assistant rolling superintendent at the Farrell works. He joined the laboratory of that works in 1927, later was transferred to the blast furnace department and since 1930 has been assistant metallurgist.

♦

G. Sinding-Larsen, associated with the engineering department of Pitts-

G. Sinding-Larsen

burgh Piping & Equipment Co., Pittsburgh, since 1924, has been appointed chief engineer.

♦

Floyd W. Eaton, supervisor of apprentices, Burroughs Adding Machine Co., has been elected chairman of the Detroit chapter, American Society of Tool Engineers. Charles W. Thiede, chief tool engineer, Chrysler Corp., has been named vice chairman; Ralph M. Smith, process engineer, Detroit Gear & Machine Co., secretary, and George W. Demarest, in charge of plant layout and process at Packard Motor Car Co., treasurer.

♦

S. R. Thomas has been appointed chief engineer, Bantam Bearings Corp., South Bend, Ind. For the past year and a half he has been manager of the automotive bearing division. Previous to that he was associated with the Cord interests for four years, where he was chief

S. R. Thomas

engineer of Auburn, Cord and Duesenberg. He will continue in charge of the automotive work.

♦

William H. Blount has been elected president and general manager, Sleeper & Hartley Inc., Worcester, Mass., manufacturer of spring making machinery. He succeeds the late F. H. Sleeper. Mr. Blount was one of the incorporators and subsequently served as superintendent, chief engineer and treasurer.

Raymond F. Russell, associated with the company since last May, has been named treasurer. Since graduation from Dartmouth college, Tuck School of Finance and Business Administration, 1915, he has been engaged in accounting, cost and sales development work.

Carl E. Spaulding, for the past three years assistant treasurer, has been re-elected to that position. Clayton E. Fisher has been placed in charge of the engineering department. The new board of directors consists of Messrs. Blount and Russell, Clarence S. Arms, consulting wire mill engineer for the company; George H. Mirick, attorney, Worcester, and Joel H. Atwood, Newton, Mass.

William H. Blount

DIED:

■ CHARLES W. HOTCHKISS, 68, former production manager, National Malleable & Steel Castings Co., Cleveland, in that city, Feb. 20. He retired in 1930, but retained his directorship in the company. He also was a director of Cleveland Tractor Co.

♦

George A. Johnson, 73, president, Ashland Malleable Iron Works, Ashland, O., at Jacksonville, Fla., Feb. 13.

♦

Frank K. Buchanan, 57, for 20 years open-hearth superintendent, Edgewater Steel Co., Oakmont, Pa., in Oakmont, Feb. 10.

♦

Edwin F. Borneman, 40, for the past 21 years purchasing agent for Graham-Paige Motors Corp., Detroit, in that city, Feb. 16.

♦

E. Dana Shaw, vice president, Decker-Reichert Steel Co., Cleveland, in that city, Feb. 23. He formerly was associated with the Morse-Rogers Steel Co., Cleveland.

♦

A. J. Hildenbrand, 41, purchasing agent, Cincinnati Milling Machine Co., Cincinnati, in that city, Feb. 20. He was affiliated with the company continuously since 1911.

♦

Edward V. Maguire, 60, director of western sales, National Screw & Mfg. Co., Cleveland, with headquarters in Chicago, Feb. 21 in Tonawanda, N. Y. He was associated with the company 19 years.

♦

Isaac F. Baker, 87, who retired seven years ago as general superintendent of the Lynn, Mass., works of General Electric Co., after serving in that capacity more than 35 years, at his home in Lynn, Feb. 17.

♦

Frank I. Baker, veteran vessel dispatcher for the Pittsburgh Steamship Co., at his home in Cleveland, Feb. 22. A resident of Cleveland since 1905, he had been associated continuously with the steamship company.

♦

Howard S. Stebbins, 75, retired iron ore sales representative of the M. A. Hanna Co., Cleveland, in Claremont, Fla., Feb. 17. He was associated with Oglebay, Norton & Co. until 1915. He then joined the Hanna company as sales representative, retiring in 1931. Former treasurer of the Lake Superior Iron Ore association, Mr. Stebbins also was a member, American Iron and Steel institute and American Institute of Mining and Metallurgical Engineers.

MEETINGS

GRAY IRON FOUNDERS PLAN INDUSTRY CONFERENCE

■ Gray iron foundry executives will hold an industry meeting at Hotel Statler, Buffalo, March 25, in connection with the annual meeting of the Gray Iron Founders' Society Inc. The morning program features speakers of national reputation. Visiting foundrymen will be entertained at luncheon, after which matters of exclusive gray iron foundry interest will be discussed. Directors will be elected by the society and these in turn will elect the officers. The meeting will close with a banquet. W. W. Rose, 1010 Public square building, Cleveland, is executive vice president of the society.

NEW YORK EXPORT CLUB SCHEDULES GET-TOGETHER

Export Managers Club of New York is conducting its annual get-to-gether at Hotel Pennsylvania, New York, March 29. Matters concerning sales, economics, financial and legislative export problems will be considered at general sessions morning and afternoon. Four group luncheons will be held, one on foreign credits, collections and exchange; another on automotive machinery and hardware. A banquet will be served in the evening.

CHICAGO ENAMELERS CLUB ARRANGES MARCH MEETING

Chicago District Enamelers club has arranged an interesting program for its March 12 afternoon meeting at Graemere hotel, Chicago. G. H. McIntyre, director of research, Ferro Enamel Corp., Cleveland, will present a paper on "Stabilization of Reflectance and Color of Re-Coat Enamel," and E. B. Rich, American Foundry Equipment Co., Mishawaka, Ind., will discuss "Application of the Wheelabrator to Enameling Plant Cleaning Problems." A moving picture is to be shown through courtesy of the Youngstown Sheet & Tube Co., Youngstown, O.

CHEMICAL SOCIETY GOES TO DALLAS FOR MEETING

Chemistry of the Southwest, including developments in petroleum, potash and sulphur, will be featured at the semiannual meeting of the American Chemical society in Dallas, Tex., April 18-21. Five special symposiums in addition to 35 scientific sessions are scheduled.

LARGE FOREIGN DELEGATION FOR MANAGEMENT CONGRESS

About 300 delegates from foreign countries are expected to attend the seventh International Management congress in Washington, Sept. 19-23. The American committee is arranging tours for them to large industrial centers so they may have the opportunity to visit plants exemplifying the most modern management methods.

The Right Honorable Viscount Leverhulme of Great Britain, president, International Committee of Scientific Management, was in the United States recently conferring with the co-ordinating committee on details. He was the guest of a number of organizations interested in management, in New York, Philadelphia and Washington.

National Refractories Co. Buys Two Plants

■ National Refractories Co. Inc. has purchased the plant and property of the Van Dyke Silica Brick Co., Van Dyke, Pa., and a majority interest in the reorganized Big Savage Refractories Corp., Frostburg, Md.

National Refractories was organized in 1935 as a sales organization, handling eastern sales for Mexico Refractories Co., Mexico, Mo., the M. D. Valentine & Bro. Co., Woodbridge, N. J., and other producing plants. It will continue to represent them.

Stockholders have voted to increase capital to $1,000,000. Roger A. Hitchins is president of the company. J. B. Arthur, president of Mexico Refractories, will become chairman of the board of National Refractories, and J. H. Kruson, vice president of Mexico Refractories, will become National's vice president in charge of operations. Principal office will be at 1520 Locust street, Philadelphia, with district sales offices in Cleveland, Pittsburgh and New York.

Names Scrap Institute's Legislative Committee

■ Louis J. Borinstein of A. Borinstein, Indianapolis, has been appointed chairman of the Institute of Scrap Iron and Steel's legislative committee by Michael V. Bonomo, institute president.

Other committee members: Vice chairman, Joseph A. Schiavone, Michael Schiavone & Sons Inc., New Haven, Conn.; M. L. Kimerling, M. Kimerling & Son Co., Inc., Birmingham, Ala.; Lewis Raphaelson, Wilmington, Del.; Nathan Lomm, Commercial Iron & Metal Co. Inc., New Orleans; Maurice D. Friedman, the M. D. Friedman Co., Ashland, Ky.

Barney Simon, Briggs & Turivas, Blue Island, Ill.; Henry Bradford, American Iron & Metal Co., Troy, N. Y.; Saul S. Frankel, Rochester Iron & Metal Co., Rochester, N. Y.; Robert Cohen, General Scrap Iron Co., Fall River, Mass.; Wesley E. Ceeley, Simon Iron & Steel Corp., Lansing Mich.; H. N. Trimble, of H. N. Trimble Co., Pittsburgh.

Not an Octopus, but Cast Alloy Steel Cutterhead

■ This intricate alloy steel casting is a dredge cutterhead made in the Link-Belt Co. foundry, Chicago. It is 86 inches in diameter, 68 inches long, 9424 pounds. One of a number of such castings made for Kling Bros. Engineering Works, it now is in service on a dredge deepening a stream channel on a government project in Louisiana

See 44% Drop In Ore Shipments

■ IRON ORE stocks at lower lake docks and furnaces May 1 will approximate 32,000,000 gross tons, about double the normal supply at the shipping season's start, it is estimated on a basis of current consumption and present stocks.

This excess is the result of heavy shipments in 1937 and the sharp curtailment in iron and steelmaking activity during the past four months. Current consumption is at a rate of less than 2,000,000 tons a month, and Feb. 1 stocks were approximately 38,000,000 tons.

Producers' estimates of 1938 shipments range from 30,000,000 to 40,000,000 tons, depending on the turn of business. Most frequently heard estimate is 35,000,000 tons, or 44 per cent less than in 1937.

Final shipping figures for last year, as compiled by the Lake Superior Iron Ore association, Cleveland, show a total of 63,110,240 tons, compared with 45,203,672 tons in 1936, a 40 per cent increase.

Shipments of beneficiated iron ore were 24,960,418 tons, compared with 17,792,457 tons in 1936, about the same proportion of total shipments. In this were included 9,554,670 tons of concentrates and 15,405,748 tons of ore crushed and screened.

All-rail shipments in 1937 were 587,281 tons, against 375,767 tons in 1936.

The number of mines on all ranges which shipped in 1937 was 155, against 135 in the preceding year. The Sellers mine shipped 6,084,400 tons last year, compared with 2,019,746 tons in 1936, and the Mahoning property shipped 5,166,410 tons, as compared with 2,521,824 in 1936.

■ Safety records for 1937 compiled by the General Electric Co., show the frequency of accidents—the number of lost time accidents per million hours worked—was lower than at any prior time in its history. For the year the mark was 6.49. The best previous year was 1936, at 6.60. Likewise, the severity rate, which accounts for days lost per thousand hours worked, shrank to 0.524 from the previous low of 0.567 in 1935.

Lake Superior Iron Ore Shipments in 1937 and 1936

Mesabi Range

	1937	1936		1937	1936		1937	1936		1937	1936
Adams Spruce	1,988,118	1,491,846	Forest	384	.....	Larkin	6,159	.....	Patrick Fines	50,361	.....
Agnew	304,577	196,643	Fraser	1,093,233	.....	Leetonia	.....	73,445	Quinn	9,435	38,043
Ajax	2,246	.....	Genoa-Sparta	29,831	52,000	Leonidas	649,557	368,092	St. Paul	.....	213,205
Albany	404,729	252,609	Godfrey-Burt	607,663	649,339	Lincoln	82,093	100,999	St. Paul-Day	151,910	.....
Alexandria	235,320	411,226	Grant	1,378,248	646,891	Mace No. 2	1,518	73,659	Sargent	225,821	199,472
Alpena	425	.....	Halobe	459,147	353,431	Magnetic Conc.	23,520	17,469	Scranton	955,191	530,003
Arcturus	945,736	416,614	Harrison	674	.....	Mahoning	5,166,410	2,521,824	Sellers	6,084,400	2,019,746
Argo (Mesabi Sinter)	3,679	.....	Harrison Annex	.....	12,129	Mahoning Rust	.....	45,074	Shada	89,460	.....
Bennett	580,670	507,574	Hartley-Burt	175,742	1,018,667	Malta	8,928	.....	Shenango	386,653	355,514
Biwabik	711,912	676,875	Hawkins	393,322	299,633	Mesabi Chief	826,400	875,409	Sliver	57,679	.....
Bruce	155,501	199,975	Hill Annex	2,469,654	2,174,422	Minnewas	1,975,207	1,652,952	Smith	54,166	.....
Burns	16,213	.....	Hill Trumbull	808,125	.....	Minorca	15,297	.....	Snyder	100,390	124,582
Burt-Pool-Day	354,318	496,676	Hugh	379	.....	Missabe Mt.	2,733,856	1,067,067	South Agnew	48,167	.....
Canisteo	606,041	1,009,880	Hull Rust	4,178,452	4,112,530	Mississippi No. 2	.....	114,786	So. Uno G. N.	.....	23,089
Chataco	91,594	.....	Joann	2,258	.....	Monroe-Tener	69,794	140,185	So. Uno N. P.	28,521	9,150
Commodore	2,751	66,467	Judd	16,182	.....	Morris	2,248,830	1,118,373	Stevenson	35,765	129,700
Corsica	437,756	151,194	Julia	.....	54,189	Morrison	1,177,853	993,293	Susquehanna	505,111	506,810
Cyprus	.....	13,951	Julia-Norman	101,450	.....	N. Harrison	114,884	9,008	Virginia	167,598	.....
Dale	222,912	50,139	Kevin	47,709	.....	N. Harrison Ann.	218,031	166,944	Wacootah	425,231	338,617
Danube	451,577	221,343	Kinney	48,366	185,703	Orwell	.....	778,987	Webb	709,237	460,491
Day	.....	7,862	Langdon	247,055	154,365	Onondaga	4,750	.....	York	82,507	60,829
Dunwoody	86,499	60,143	LaRue	305,539	246,764	Pacific	99,491	.....			
						Patrick Ann.	127,702	76,268	Total	45,823,571	31,411,851

Menominee Range

	1937	1936		1937	1936		1937	1936		1937	1936
Baltic	8,905	.....	Davidson Group	191,629	149,572	James	218,973	142,755	Tobin	59,352	113,293
Bates	153,546	154,385	Fogarty	93,648	30,510	Loretto	2,382	5,067	Virgil	172,498	121,255
Bengal	102,059	.....	Forbes	289,296	164,054	Matilda	2,020	.....	Warner	6,379	.....
Berkshire	52,784	87,935	Globe-Cornell	54,954	.....	Millie	.....	13,417	West Chapin	.....	20,729
Bradley	66,304	.....	Hiawatha No. 1	282,413	203,649	Penn Mines	310,727	307,981	Zimmerman	2,574	67,724
Buck	227,604	123,134	Hiawatha No. 2	105,896	163,302	Riverton	35,728	109,698			
Caspian	10,381	106,401	Hiawatha No. 3	.....	4,200	Rogers	17,980	12,885	Total	2,649,062	2,163,679
Cornell	.....	5,435	Homer	181,030	55,006	Sherwood	.....	1,292			

Marquette Range

	1937	1936		1937	1936		1937	1936		1937	1936
Archibald	6,078	10,335	Champion	1,965	.....	L. Sup.-Holmes	217,037	287,981	Republic	607	.....
Athens	476,039	338,694	Cliffs Shaft	515,840	538,663	Lloyd	598,116	353,106	Richmond	209,428	219,152
Blueberry	442,101	401,547	Francis	36,366	57,308	Maas	778,757	582,931	Stephenson	35,806	8,995
Breitung-Hematite No. 1	5,354	.....	Gardner-Mackinaw	152,616	152,017	Mary Charlotte	15,423	.....	Tilden	305,418	291,341
Cambria	.....	265,368	Greenwood	37,658	35,502	Morris	385,375	300,886	Volunteer	415,352	231,972
Cambria-Jackson	311,157	.....	Jackson	.....	2,324	Negaunee	792,506	548,884			
						Princeton	8,813	883	Total	5,747,812	4,627,889

Gogebic Range

	1937	1936		1937	1936		1937	1936		1937	1936
Anvil	113,661	30,203	Ironton	295,139	494,235	Penokee	111,662	.....	Wakefield	255,309	249,880
Cary	243,694	213,398	Keweenaw	180,762	27,663	Plymouth	740,691	606,900	West Davis	669,040	329,214
Davis	6,628	.....	Montreal	1,174,185	706,475	Puritan	261,168	331,786			
Eureka-Asteroid	462,392	365,174	Newport	418,316	670,813	Sunday Lake	582,906	477,936	Total	5,661,270	4,630,341
Geneva	144,780	62,923	Palms	937	831	Townsite	.....	62,910			

Cuyuna Range

	1937	1936		1937	1936
Alstead-Hillcrest	241,998	253,723	Feigh Stock	.....	56,197
Alstead Stock	.....	16,460	Louise	175,610	65,530
Armour No. 1	52,112	8,370	Mahnomen	371,387	239,616
Evergreen	121,554	126,330	Merritt	92,453	47,796

Vermilion Range

	1937	1936		1937	1936
Portsmouth	134,536	140,007	Pioneer	597,318	543,954
Sagamore	408,847	265,397	Sibley	236,984	128,695
South Hillcrest	86,064	.....	Soudan	194,752	148,876
Wearne	90,884	86,013	Zenith	424,026	242,948
Total	1,775,445	1,305,439	Total	1,453,080	1,064,473
GRAND TOTAL				63,110,240	45,203,672

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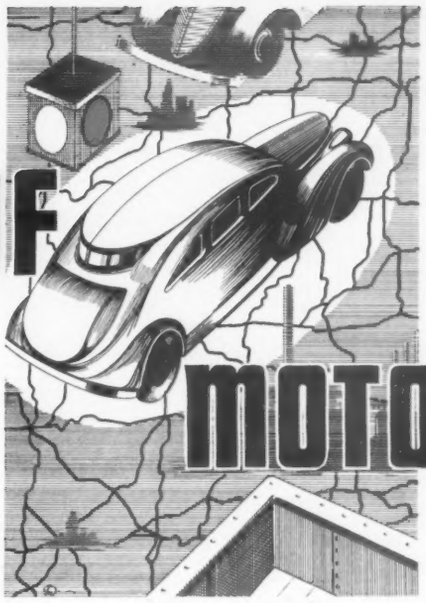


DETROIT

■ CAST iron and aluminum have been standard automobile cylinder head materials, with opinion about equally divided as to their relative merits, although progressive increases in fuel octane ratings have made the picture brighter for aluminum. Further, the fact that aluminum heads weigh about half as much as cast iron gives advantage in freight costs for cars assembled at some distance from the source of the heads.

Experiments with other cylinder head materials, such as brass and aluminum bronze, have been made, apparently without success.

More recently, however, some rather remarkable performance records are being hung up for cylinder heads of copper alloy. Federal-Mogul Corp. here has introduced cylinder heads of copper-chromium-phosphorus alloy for installation on Ford V-8 engines, which may be the forerunner of widespread changes in head construction.

High Heat Conductivity

The electric furnace alloy is produced under license from Union Carbide & Carbon Corp. and was developed by metallurgists of Federal and UCC working in co-operation. Production currently is averaging about 30 pairs of heads per day, which naturally means costs are high, but it has been determined that the parts can be cast on a production basis eventually, with appreciable reduction in cost. Right now, it would cost the Ford owner $49.72 to make the changeover to copper heads.

Most important feature of the new head is its high heat conductivity—80-85 per cent of the figure for pure copper. This compares with 30 per cent for aluminum, and 11-12 per cent for cast-iron. This factor, combined with what Federal terms "spot and fin" cooling, permits a design of solid metal with no water jackets whatsoever. Water ports in the block are covered over by the copper alloy head, with the exception of three through which water passes into a copper alloy manifold and then back to the radiator.

Thus an extremely thin head can be produced, some sections measuring as little as 3/16-inch. Elongation of 18 per cent and a high degree of stiffness of the metal, plus a ribbed design, also facilitate a thin section, weight of the complete head (one side) being only 14.75 pounds, compared with 20.5 for cast iron and 11 for aluminum.

The question naturally follows: Why copper alloy heads? The answer given is: Greatly improved power and economy. Tests by Federal engineers have shown power increases on the V-8 engine up to 15 per cent. The following official figures, obtained on carefully checked tests with a 1938 Ford having gear ratio of 4.11 to 1, 85-horsepower V-8 engine, tell the economy story:

Speed, m. p. h.	Head	Miles per gallon
20	Aluminum	19.68
	Copper	23.75
30	Aluminum	18.39
	Copper	22.30
40	Aluminum	18.03
	Copper	20.69
50	Aluminum	16.14
	Copper	19.56
60	Aluminum	14.55
	Copper	16.00

This test run was made on a straightaway, level one-mile stretch of road. A similar test in which the car was driven through traffic showed average economy of 19.56 miles per gallon. It should be remembered that the aluminum head in these tests was water cooled. What the story would be with aluminum heads dispensing with all or part of the water cooling is something else again.

The copper alloy heads are cast in green sand, and after being broken out are given a double heat treatment, or precipitation hardening, involving heating to 1600 degrees Fahr. and quenching, followed by annealing at 840 degrees Fahr. to gain the required hardness.

In making the change to copper alloy heads the following parts are needed: Forty-two head studs, required because of the thinner-size head; 42 nut washers, 1-inch diameter; right and left water manifolds with accompanying yokes; seven copper-asbestos gaskets; and of course two heads. Different spark plugs also are required, since those used with present heads are of too "hot" a type to be suitable. Operating temperature of the head, by the way, is shown to vary from 220 to 450 degrees Fahr.

The entire development is a significant metallurgical change and it is entirely conceivable that Ford, or some other car builder for that matter, might undertake to adapt the design as standard equipment when and if production costs are brought down to a more competitive basis.

■ IT IS reliably reported Ford engineers are now developing a smaller type car which would embody the chassisless-type frame of welded tubular steel used by Lincoln Zephyr and the former Chrysler airflow models, with wheelbase shortened, undivided windshield and rear window, 60-horsepower motor and probably priced considerably below anything Ford now offers. It undoubtedly will be several months before this model can be put in production, but it is said now to be in the active stage.

A new sedan-limousine has been added to the DeSoto line. Features

BY A. H. ALLEN
Detroit Editor, STEEL

include 136-inch wheelbase, 100-horsepower engine with aluminum head, and custom interior appointments.

■ OPENING guns will be fired March 5 in a gigantic eight-day cooperative campaign to move used cars when automobile manufacturers jointly will unloose $1,250,000 for an institutional used-car advertising program. Conceived by the Ford sales department, the plan was sold quickly to other manufacturers and will involve broad scale advertising in 1900 daily newspapers, 300 Sunday papers, 75 foreign language papers, a large list of weeklies, 400 radio stations and billboards in every city over 25,000 population. Contributions of the various manufacturers to the total expenditures are based on the proportion of total 1937 production accounted for by each.

Possibly as a guide to the best method of approach to used car merchandising, General Motors customer research staff has mailed out 1000 questionnaire booklets which seek to determine what influences the average buyer of a used car in making his choice. Answers should provide some dependable information on the most productive merchandising method. The effort marks what is believed to be the first attempt on the part of a manufacturer to analyze used car buying habits.

New Car Sales Up

Field reports on new car sales indicate sharp improvement over January in most cases. Dodge, for example, notes a rise of 84.8 per cent for the first three weeks of this month as compared with the first three weeks of January. For the same period, an increase of 47 per cent was shown in commercial cars and trucks. This fact, plus data obtained from an "experience table" which shows that over the past five years March sales have averaged 62 per cent higher than February, leads to the conclusion an important upward movement in assembly schedules is not far off. And April should see still further improvement, since by again referring to the "experience table" April sales average some 22 per cent ahead of March.

Preliminary sales reports for February from Buick dealers indicate continued improvement in new and used car sales, particularly in eastern and southern areas of the country.

Meanwhile dealers throughout the country are being shown the latest methods of reconditioning used cars in anticipation of the March merchandising drive. Last week, for example, was "national used car reconditioning week" for Pontiac dealers, and under spirited urging from headquarters here they set about sprucing up the appearance of all old cars in stock.

Chrysler dealers have hauled out their arc welders, solder sprays, pneumatic bumping hammers, hydraulic body-fender-frame wreck units and other newly acquired equipment for reconditioning work, and likewise are getting set for the coming campaign.

■ A FLEET of 48 all-white Plymouth coupes formed a half-mile caravan recently driven out of Detroit for a large oil company which will put the cars in service throughout the country to inspect a chain of 90,000 "registered" restrooms which are being set up by the company and its 45,000 dealers.

Hudson has added a six-passenger brougham body to its new 112 line.

Automobile Production

Passenger Cars and Trucks—United States and Canada

By Department of Commerce

	1936	1937	1938
Jan.	377,244	399,634	*250,000
Feb.	300,810	383,698	.....
March	438,943	519,177	.....
April	527,625	553,415	.....
May	480,518	540,357	.....
June	469,368	521,139	.....
July	451,206	456,909	.....
Aug.	275,934	405,064	.....
Sept.	139,820	175,620	.....
Oct.	230,049	337,979	.....
Nov.	405,799	376,637	.....
Dec.	518,958	346,886	.....
Year	4,616,274	5,016,565	.....

*Preliminary.

Week ended	
Jan. 29	59,365
Feb. 5	51,443
Feb. 12	57,810
Feb. 19	59,100
Feb. 26	56,977

	Week ended Feb. 26	Feb.19
General Motors	21,950	21,560
Chrysler	10,450	9,850
Ford	15,570	19,265
All others	9,007	8,425

W. C. Cowling, for 23 years active with Ford Motor Co., and until recently in charge of sales, has been elected vice president of Willys, and on March 1 will take over his new duties in Toledo, O.

Dissatisfaction on the part of managements has led to major upheavals in the activities of at least two large automobile manufacturers here. Realignment of personnel and virtual ultimatums to "produce or else" have been the consequences. One of the largest engineering departments here has been given a thorough shaking up and a new director installed. In the latter case, it has been suggested that the management attributed part of the poor sales record of the past four months to defections in design work coming from its engineers.

■ QUICKENING of interest in the industrial building field is reported as a number of inquiries were received last week for this type of work. Option on 202 of the 700 acres downriver which American Rolling Mill Co. had held for several years was taken up by an interest here, whose identity as yet is undisclosed. Work has been resumed on filling portions of this property preparatory to building.

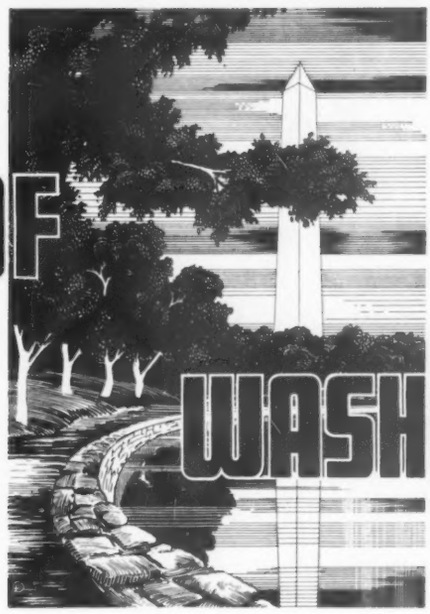
An eastern machine tool builder decided last week to go ahead with plans for a new manufacturing and assembly plant in Connecticut, a project deferred since last summer.

Engineering department of Norge Corp. has completed plans for its new two-story manufacturing unit to be erected in Muskegon, Mich., at a cost of $400,000.

■ A PROGRAM of construction and replacement for 1938, calling for expenditure of $18,000,000 was announced by Detroit Edison Co. in its annual report for 1937. The expansion will include three new turbogenerators with high-pressure boilers and accessories. Power load in the Detroit district for 1937 was 50 per cent ahead of the 1929 figure, and in the past year the company made 25,000 new business and industrial connections . . . . New plant for the Sunlight Electrical division of General Motors at Warren, O., will provide 120,000 square feet of manufacturing space, marking the third major expansion by GM in Warren in the past two years. Scheduled for completion May 15, the plant will manufacture fractional horsepower motors, doubling present facilities . . . . About 75

Commenting on the used car situation, H. J. Klingler, Pontiac general manager, observes that the bulk of present used cars are of a vintage of 1930 or later, a period in which the greatest development in design and engineering in the history of the industry took place. Vibration was brought under control, independent springing was perfected, lighter and stronger alloys were adopted, countless other improvements made with the result the average low-price cars of the post-depression era show about twice the life of those built before 1930.

WINDOWS OF WASHINGTON



BY L. M. LAMM

Washington Editor, STEEL

WASHINGTON

■ DUE TO disagreement among its proponents over the O'Mahoney-Borah federal licensing bill for corporations a much simplified bill has been introduced in the senate and referred to a committee. In explaining the bill Senator O'Mahoney said that four major changes have been made, the most important being that corporations in interstate commerce with gross assets of $100,000 or less would be exempt.

One section would authorize the federal trade commission to require licensing of smaller corporations if their engagement in practices prohibited to the licensed corporations were found to constitute unfair competition with the licensed corporations.

The power of revoking licenses is vested solely in the courts, according to the revised bill. Another change provides that no "unlawful" trust or corporation shall be entitled to a license and still another eliminates former provisions expanding the federal trade commission's membership and directing it to make an immediate study of economic conditions with a view to recommending a stabilization program.

Senator O'Mahoney, in discussing the new bill, said: "These changes are the result of numerous conferences we have had in the last several weeks with students of the problem in and out of the government."

Hearings will be held on the revised bill beginning March 1.

EDUCATION IN WARTIME PRODUCTION IS PLANNED

Assistant Secretary of War Johnson stated last week that if a pending bill is approved by congress what he termed "educational orders" to train industrial plants in making war materials will be placed by the war department.

Secretary Johnson explained that if this idea is carried out the test orders will be for such things as machine guns, boxes of cartridges and anti-aircraft guns, probably asked for in educational orders of ten each. He said that such orders would go, for instance, to automobile companies, phonograph concerns, radio and radiator companies and similar manufacturers now engaged in manufacturing commercial products. The real obstacle in the way of the authorization of such orders is the governmental purchasing requirements for competitive bids, but if the pending bill is passed, that situation will be taken care of.

CLAIMS LOW DUTY HURTS DOMESTIC MANGANESE

Representative Case, South Dakota, addressed the house last week, maintaining that the administration should restore the duties on manganese, cut by reciprocal agreements. Mr. Case laid considerable stress on what has been done to the domestic development of manganese through putting into effect the reciprocal agreement with Brazil.

The net results of the Brazilian trade agreement on manganese, he said, have been three-fold. "In the first place, in the first two years of its operation this agreement on manganese alone has cost the treasury $10,000,000 in revenue. In the second place it has thrown men out of work and retarded the development of the domestic manganese industry. In the third place it has now brought us face to face with a situation which is critical from the standpoint of national defense."

In discussing the fact that the treasury has lost $10,000,000 in tariff revenue that would have been paid had the manganese tariff not been reduced by the Brazilian agreement, he explained that under the act of 1930 the tariff was 1⅞ cents a pound on ferromanganese, and 1 cent a pound on metallic manganese in the form of ore. The Brazilian agreement cut the tariff a maximum of 50 per cent on crude manganese ore, from 1 cent to a half a cent; the Canadian agreement cut practically a maximum of 50 per cent on ferromanganese, from 1⅞ cents to 1 cent.

"This has resulted in a loss of revenue to this country," he said, "an increase in importations of manganese, a destruction of our manganese industry and making us dependent today on ores 4000 miles away."

Mr. Case told the house that the domestic manganese producers have assured him that if the tariff were restored to the amount provided in the tariff act of 1930 the price would now be sufficient so that domestic ores would be properly developed and would provide what we need.

AFL BACKS SIMPLE BILL FOR WAGE-HOUR CONTROL

In view of pending action in the house in connection with the proposed wage and hour bill, the American Federation of Labor has again become active.

"We are against any bill," said William Green of the federation, "delegating sweeping administrative powers to a federal wage board or a federal administrator."

The federation submitted a simple bill at the special session of congress, the provisions of which, Green maintains, are clear-cut and uniform throughout the nation.

"This law," he said, "simply established minimum wage and maximum hour rates for the entire country. It provided quick punish-

ment for violations through prosecution of violators in the federal courts by the department of justice. Essentially, that was all there was to it. No more is needed for an effective law.

"Believing such a law would increase purchasing power, stimulate industrial production, reduce unemployment and prove helpful to the under-privileged groups whose lot the administration is anxious to improve, the American Federation of Labor will submit a new draft to the house labor committee in a short time. The measure will incorporate the fundamental principles of the federation's original bill with only some minor modifications. We trust congress will see fit to adopt it."

COAL COMMISSION WIPES OUT MINIMUM PRICES

Minimum coal prices set by the national bituminous coal commission Nov. 30 have been revoked by the commission by unanimous vote, opening the way to free competition. This action followed court orders suspending the new rates in specific instances.

It was decided the commission could make better progress by wiping the slate clear of the 30,000 prices set up after nine months work, rather than attempt to patch the schedules. It is estimated the greater part of a year will be required to formulate a new set of rates.

Court interference had been obtained on the plea that prices had been determined by the commission without open hearings. Coal producers and representatives of miners agreed with the commission in its decision.

BRITAIN LARGE BUYER OF AMERICAN STEEL GOODS

In view of interest created by the proposed trade agreement between the United States and the United Kingdom, figures just compiled by the department of commerce are interesting.

These figures show that the greatest gain, both actually and relatively, occurred in exports from the United States of metals and manufactures. In 1937 the value of the commodities included in this classification amounted to approximately $55,000,000, an increase over 1936 of $37,000,000. Exports of pig iron which were negligible in 1936 were valued at over $6,000,000 in 1937. Exports of iron and steel scrap valued at more than $15,000,000 in 1937 were approximately $12,000,000 greater in value than in 1936.

Machinery and vehicles exported to the United Kingdom in 1937 were valued at more than $72,000,000, an increase of $15,000,000 over 1936. Contributing to this increase was a gain of $7,500,000 in shipments of metalworking machinery, exports of which were valued at over $19,000,000 in 1937, and substantial increases in many other kinds of machinery.

JAPAN PLANS LIMIT ON SCRAP, PIG IRON IMPORTS

Various measures for control of imports into Japan during 1938 are now being considered by the Japanese government, according to unofficial reports to the department of commerce. These point out that the Japanese department of finance has tentatively decided to limit imports of pig iron and scrap iron to approximately half the 1937 total.

This would mean, it is stated, that during the year about 1,500,000 metric tons of scrap and between 400,000 and 500,000 tons of pig iron, excluding imports from Manchuria, would be received during 1938. Imports in 1937 are believed to have reached a record high, probably about 50 per cent more than in 1936, the previous record high. A proposal is said to be under consideration in Japan to place all local iron ore mines under control of the Japan Iron Mfg. Co.

JAPAN AND MEXICO DENY IRON ORE NEGOTIATIONS

A story has been current in Washington for the past week that the Japanese government is negotiating with the government of Mexico for certain iron ore concessions located near the harbor of Mazatlan and which are now said to be in the possession of the Bethlehem Steel Corp.

State department officials deny they know anything about the rumored negotiations and the Mexican embassy has officially denied there is any truth in the reports. Dispatches have been received from Tokyo quoting an official spokesman in Japan to the effect that the reports are false.

It is said by those in a position to know that Bethlehem has spent some $700,000 in experimental work at the mines.

The matter created considerable interest last week because it is claimed the Japanese want to get a lot of workmen at the mines in order to use Mazatlan harbor as a possible landing place on the North American continent.

COMMERCE CHAMBER ASKS SIMPLER GOVERNMENT PLAN

Simplification and economy in government are called for in a report made last week by the United States Chamber of Commerce for extension of the merit system, strict control of budgeting and accounting methods, demobilization of emergency agencies and dissolution of most government corporations.

It is proposed that any government reorganization, other than one strictly along mere administrative lines, should have as its major objective reduction and simplification of federal governmental functions, strengthening of state governments and rebuilding of local responsibility.

The report supports the position that nothing should be done to interfere with the existing independent status of quasi-judicial commissions. The report also favors pending proposals to cover into the civil service, under proper safeguards, employes of many temporary agencies.

LABOR BOARD ACTIVELY REGULATING EMPLOYERS

The national labor relations board has announced that an election will be held within 15 days among production workers of the Atlantic Basin Iron Works, Brooklyn, N. Y.

The workers will choose whether they will be represented by the industrial union of marine and shipbuilding workers of America, local No. 13, or the American Federation of Labor.

The board also has announced a cease and desist order against the National Motor Bearing Co., Oakland, Calif., directing the company to reinstate 56 employes with back pay from Feb. 27, 1937, the date the company locked out its employes in an effort to stem an organization drive by the United Automobile Workers of America. Workers hired by the company since that date must be discharged if necessary to make room for the reinstated employes, the board further ruled.

Announcement was made by the board last week of an order against the Zenite Metal Corp., Indianapolis, manufacturer of automobile moldings and other metal products, directing it to bargain, upon request, with the United Automobile Workers of America as the exclusive agency of its employes, except buffers, and certain other classes.

The board directed the company to cease giving effect to its June 9, 1937, closed shop contract with the International Association of Machinists, and to grant remuneration to employes found to have been discharged June 16, in an alleged effort by the company to force them to join the machinists' union.

PHILIPPINE IMPORTS GROW

Imports of iron and steel products into the Philippine Islands last year registered a considerable increase over the preceding year, according to the American commercial attache in Manila. It is stated that much of the 1937 increase was from Germany and Belgium because most of those orders had been placed in 1936, and were not delivered until 1937.

Steel Imports Deprive Workers of Wages; Influence Felt Far from Tidewater Points

■ DURING the early part of the 1929 depression the newspapers devoted much space to reports of bank failures all over the United States. To residents of unaffected communities these stories were interesting and became subjects of casual conversation. It was not until their own banks closed that they understood the full import of bank failures.

Similarly, prevailing interest in importations of iron and steel products is largely casual excepting along the seaboard where the full significance of such competition is understood. The fact is, as stated in a brief just submitted by the American Iron and Steel Institute to the government's committee in charge of formulating the proposed reciprocal tariff agreement between the United States and the United Kingdom, that our policies governing imports are of vital importance to this country as a whole.

Even Small Tonnages of Foreign Steel Have Wide Price Effect

While imports of iron and steel products comprise a small fraction of the country's total consumption and are sold mainly in seaboard areas, the ultimate effect of such competition is widespread. Distributors or users of such products located at seaboard are in direct competition with inland users or distributors. Too, the seaboard areas exposed to this competition are important steel markets for domestic mills wherever located. The result is a process of infiltration by which the low prices on imported products affect our entire domestic price structure.

Just why this matter of iron and steel imports is of as great significance in Pittsburgh, Cleveland and Chicago as it is in New York, New Orleans and San Francisco, may be revealed by an interpretive analysis of the 1937 import statistics, as reported in STEEL of Feb. 7.

Total 1937 imports, not including scrap, were 451,520 gross tons. This included 111,697 tons of pig iron, 1872 tons of sponge iron, 45,096 tons of ferroalloys, 416 tons of malleable iron pipe fittings, 3282 tons of cast iron pipe and fittings and 289,-157 tons of iron and steel products. The latter included principally bars, concrete reinforcing bars, structural shapes, wire rods, pipe, hoops and bands, wire, sheets, sheet piling, rails and fastenings, barbed wire and nails, tacks and staples.

United States Importing Steel Is Carrying Coal to Newcastle

It is calculated by the United States department of commerce that, with plants operating at 55 to 60 per cent of capacity, 53 man-hours, on the average, are required to produce a ton of steel products. On this basis the 289,157 gross tons of steel products imported from abroad in 1937 were equivalent to 15,325,321 man-hours of work. These imports robbed American workmen of work over 383,133 weeks of 40 hours. If this steel had been made in this country, it would have provided steady work all through 1937 for 7368 American workmen.

Encouraging the importation of iron and steel into an important steelmaking country like the United States is comparable to encouraging importation of coffee into Brazil or beef into the Argentine. Encouragement should be limited to those products which we are unable to make in the desired volume or quality. Our first obligation is the promotion of our own industries, and the maximum employment of our own wage-earners.

THE BUSINESS

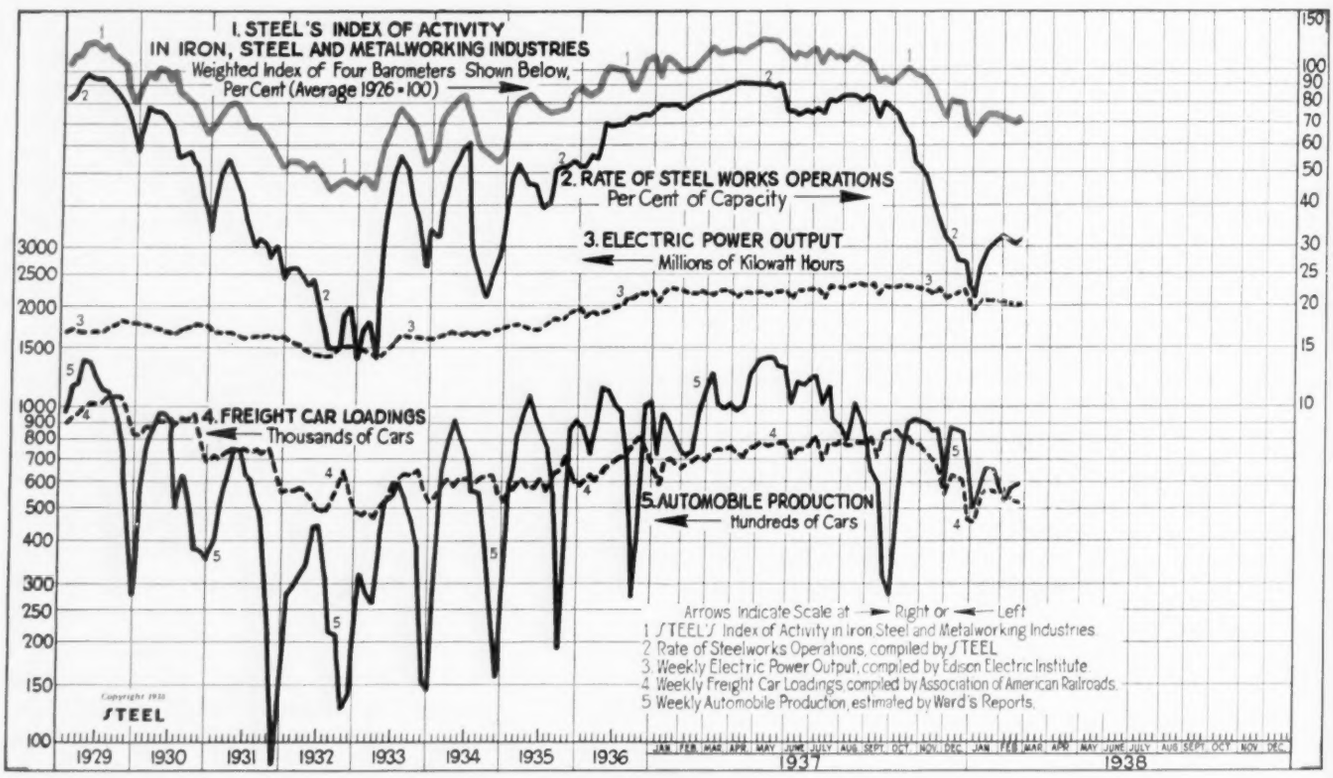
Outlook Still Clouded As Third Month Looms

■ TANGIBLE evidence that the pace of business is not recovering as rapidly as was expected prior to New Years day is found in the record of industrial activity since the turn of the year.

STEEL's index of activity in the iron, steel and metalworking industry has remained almost stationary for the last three weeks at around the level of 70. It still remains below 79.4 established on Dec. 18, the last full week in 1937 before the holiday interruptions occurred. For the week ending Feb. 19 it stands at 71.9 a modest gain from the previous week.

Downward movement in electric power output and in revenue freight car loadings since the middle of January reflect the sluggishness of industrial activity generally. Car loadings now are below the 550,000-car-per-week level, whereas a year ago loadings were hovering around the 700,000 mark. Electric power output so far this year has fallen considerably behind the comparable period in 1937, until now it is at about 2,059,165 kilowatt-hours compared with 2,211,000,000 a year ago.

The rate of steelworks activity has mounted slowly


1. STEEL'S INDEX OF ACTIVITY
IN IRON, STEEL AND METALWORKING INDUSTRIES
Weighted Index of Four Barometers Shown Below,
Per Cent (Average 1926 • 100)
2. RATE OF STEEL WORKS OPERATIONS
Per Cent of Capacity
3. ELECTRIC POWER OUTPUT
Millions of Kilowatt Hours
4. FREIGHT CAR LOADINGS
Thousands of Cars
5. AUTOMOBILE PRODUCTION
Hundreds of Cars
Arrows Indicate Scale at → Right or ← Left
1 STEEL'S Index of Activity in Iron, Steel and Metalworking Industries
2 Rate of Steelworks Operations, compiled by STEEL
3 Weekly Electric Power Output, compiled by Edison Electric Institute
4 Weekly Freight Car Loadings, compiled by Association of American Railroads
5 Weekly Automobile Production, estimated by Ward's Reports
Copyright 1938 STEEL
1929 1930 1931 1932 1933 1934 1935 1936
1937
1938

STEEL'S index of activity gained 0.7 points to 71.9 in the week ending Feb. 19:

Week ending	STEEL's Index of Activity Index No.		Steelworks Operating Rate Per Cent		Electric Power Output Million KWH		Freight Car Loadings		Weekly Auto Output	
	1937	1936	1937	1936	1937	1936	1937	1936	1937	1936
Nov. 20	84.9	109.9	35.0	74.5	2,224	2,196	647,251	790,500	85,757	110,160
Nov. 27	72.7	105.2	31.5	75.5	2,065	2,133	558,627	679,984	58,955	104,283
Dec. 4	81.5	108.4	30.5	76.5	2,152	2,243	623,337	744,957	86,173	100,395
Dec. 11	80.5	113.9	27.0	77.5	2,196	2,278	622,131	738,747	85,765	119,455
Dec. 18	79.4	114.8	27.0	79.5	2,202	2,274	603,292	729,696	82,025	121,038
Dec. 25	69.5	93.3	23.0	68.0	2,085	2,080	460,367	562,218	67,230	79,019
	1938	1937	1938	1937	1938	1937	1938	1937	1938	1937
Jan. 1	62.7	96.6	21.0	79.0	1,998	2,069	457,359	587,953	49,550	71,800
Jan. 8	70.1	107.8	26.0	79.5	2,139	2,244	552,314	698,529	54,084	96,780
Jan. 15	74.4	106.7	29.0	79.0	2,115	2,264	580,600	700,238	65,735	91,685
Jan. 22	74.7	104.0	30.5	80.0	2,108	2,256	570,333	670,376	65,418	81,395
Jan. 29	73.8	99.6	33.0	76.0	2,098	2,214	553,176	659,790	59,365	74,148
Feb. 5	70.9	100.8	31.0	79.5	2,082	2,201	564,740	675,026	51,443	72,295
Feb. 12	71.2	101.9	30.0	81.0	2,052	2,199	542,991†	691,618	57,810	72,850
Feb. 19	71.9*	108.8	31.0	83.0	2,059*	2,211	535,000*	714,884	59,100	95,698

*Preliminary. †Revised.

STREND

since the first of the year receding but once during this period, and now in the closing weeks of February is dragging at slightly above 30 per cent. This index reached a low of 21.0 per cent in the week ending Jan. 1, from which point it rose to 33 per cent

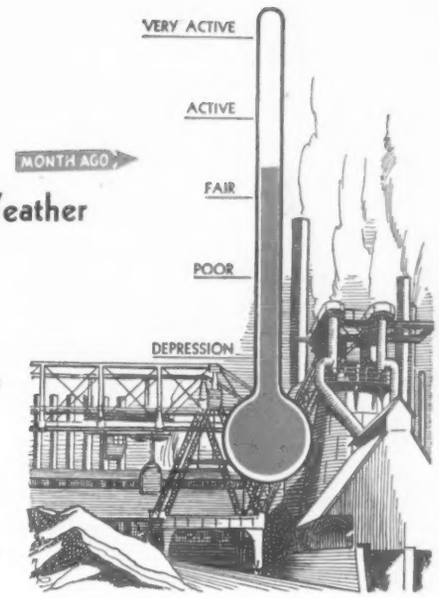
Where Business Stands

Monthly Averages, 1937=100

	Jan. 1938	Dec. 1937	Jan. 1937
Steel Ingot Output	41.7	35.5	114.1
Pig Iron Output	46.4	48.2	103.2
Freight Movement	63.9	76.2	91.4
Building Construction	51.4	76.8	89.5
Automobile Production	59.8	82.9	95.6

by the end of January and since then it has fluctuated below this temporary peak and is now placed at 31.0 per cent for the week ending Feb. 19.

Automobile output, after improving substantially from a low of 49,550 units in the week ending Jan. 1, to 65,735 cars in the week ending Jan. 15, has since receded somewhat from that point, fluctuating be-



Industrial Weather

TREND:
Uncertain

tween the 50,000 and 60,000-car level. But the outlook in this industry is improving with the used car jam clearing up somewhat and the prospects of a stimulating seasonal demand close at hand.

New orders for machine tools and foundry equipment declined in January, indicating that the trend in forward commitments has been affected by the uncertainty displayed in the current operations of industry. Developments in the next few weeks should indicate whether or not business is prepared to go through with the expected moderate improvement stimulated by increased seasonal demands.

The Barometer of Business

Industrial Indicators

	Jan., 1938	Dec., 1937	Jan., 1937
Pig iron output (daily average, tons)	46,426	48,999	103,863
Machine tool index	129.6	140.8	201.7
Finished steel shipments	518,322	489,070	1,149,918
Ingot output (daily average, tons)	66,626	56,625	182,181
Dodge building awards in 37 states (sq. ft.)	19,200,000	28,718,400	33,470,000
Automobile output	*250,000	346,000	399,634
Coal output, tons	30,173,000	36,226,000	40,940,000
Business failures; number		932	811
Business failures; liabilities		13,291,000	8,661,000
Cement production, bbls.		7,044,000	6,633,000
Cotton consumption, bales	435,000	433,000	678,100
Car loadings (weekly av.)	564,106	553,297	663,377

*Preliminary.

Financial Indicators

	Jan., 1938	Dec., 1937	Jan., 1937
25 Industrial stocks	$157.00	$154.52	$235.41
25 Rail stocks	$23.02	$23.70	$43.56
40 Bonds	$71.44	$74.17	$90.31
Bank clearings (000 omitted)		$25,805,000	$27,226,000
Commercial paper rate (N. Y., per cent)	1	1	1
*Commercial loans (000 omitted)	$9,038,000	$9,387,000	$8,943,000
Federal Reserve ratio (per cent)	80.2	80.0	80.4
Railroad earnings†	$25,971,525	$32,440,920	$70,505,535
Stock sales, New York stock exchange	24,145,011	48,605,047	67,211,035
Bond sales, par value	$166,080,100	$198,194,025	$343,532,400

*Leading member banks Federal Reserve System.
†December, November and December, respectively.

Foreign Trade

	Jan., 1938	Dec., 1937	Jan., 1937
Exports		$319,756,000	$221,550,000
Imports		$208,863,000	$240,396,000
Gold exports		$15,052,000	$11,000
Gold imports		$33,033,000	$121,336,000

Commodity Prices

	Jan., 1938	Dec., 1937	Jan., 1937
STEEL'S composite average of 25 iron and steel prices	$38.95	$38.88	$36.55
Wheat, cash (bushel)	$1.13	$1.09	$1.49
Corn, cash (bushel)	$0.76	$0.72	$1.26

Biltmore hotel will be headquarters for the Western Metal congress in Los Angeles, March 21-25. Many of the technical sessions and entertainment features of participating groups will center here

Los Angeles Host To Western Metal Congress and Show

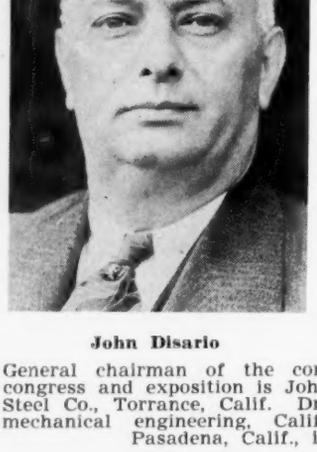
■ INDUSTRIAL executives, plant operators, metallurgists and engineers of the Pacific Coast once more are to have an opportunity to view at close range recent developments in the manufacture, fabrication and uses of metals. The third Western Metal congress and exposition, in Los Angeles, March 21-25, presents this opportunity, and it is being arranged on the general theme of "Metals in Industry." The first congress and show of this kind in the West was held in Los Angeles in 1929. Its success was so marked that a second was conducted in San Francisco two years later, and a plan then was evolved to follow through on alternate years with similar events. Suspension of this program was made necessary, however, by the depression.

Chief sponsor of all three congresses and expositions is the American Society for Metals. Co-operating with it in the 1938 effort are western sections of 17 national technical societies. Among the latter are the American Welding society; American Society of Mechanical Engineers; American Chemical society; American Foundrymen's association; American Institute of Electrical Engineers; American Institute of Mining and Metallurgical Engineers; American Petroleum institute, California division; American Society of Civil Engineers; American Society for Testing Materials; Chamber of Mines and Oils; Institute of Aeronautical Sciences; Metals Trades and Manufacturers' association; Mining Association of the Southwest; National Association of Purchasing Agents; Pacific Coast Electrical association; Pacific Coast Gas association; and Society of Automotive Engineers.

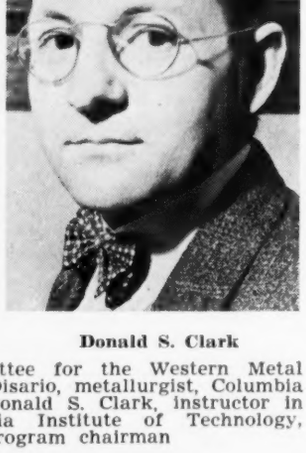
American Society for Metals, American Welding society, American Society of Mechanical Engineers and Pacific Coast Gas association will meet independently in their own technical sessions throughout the week. Headquarters will be at the Biltmore hotel. In the various sessions, attention will be focused upon metals used in the petroleum, aviation, general manufacturing, chemical and mining industries. Many of the speakers will be from the eastern part of the United States.

The exposition is to be held in the Pan-Pacific auditorium which affords 100,000 square feet of exhibition space. Most of this will be required by the 125 companies which are to be represented with displays of their products. Three-fifths of these companies are located east of the Mississippi river. Purpose of the show is to bring to western buyers of industrial equipment the latest developments in metals and machinery. Exhibits will feature production, selection, fabrication, inspection, treatment, welding and use of metals. Displays of oil field tools will be extensive.

Program of the American Society for Metals embraces 11 technical sessions and 43 papers covering a wide field. Morning sessions will be at the Biltmore hotel; afternoon sessions at the Pan-Pacific auditorium. A feature of the congress program is to be a five-lecture educational course on "Fundamentals of Ferrous Metallurgy" to be conducted by Dr. A. Allan Bates, manager of chemical and metallurgical department, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. Lecture 1 will deal with "Iron and Carbon"; lecture 2 with "Heating and Cooling of Steel"; lecture 3 with "Steel Treating"; lecture 4 with "Properties of Steels"; and lecture 5 with "Selection and Use of Steels."



John Disario



Donald S. Clark

General chairman of the committee for the Western Metal congress and exposition is John Disario, metallurgist, Columbia Steel Co., Torrance, Calif. Dr. Donald S. Clark, instructor in mechanical engineering, California Institute of Technology, Pasadena, Calif., is program chairman

The meeting of the American Welding society will constitute a western regional conference. Five morning sessions, to be conducted at the Biltmore hotel, will deal with many phases of welding practice and will include the presentation of 18 technical papers. Two luncheon meetings also are sched-

uled. The meeting of American Society of Mechanical Engineers is the society's national spring meeting. It will be at the Biltmore hotel and sessions will total 13. For those attending from the East, a train tour is being arranged, with return by either rail or water.

Exposition hours are from 12 to 10 p.m. each day except Thursday when the closing hour is 6 p. m. on account of the American Society for Metals dinner-dance.

William H. Eisenman, national secretary, American Society for Metals, Cleveland, has directed organization of the congress and is manager of the exposition.

Program of American Society for Metals

Monday, March 21

9:30 A. M.—Biltmore Hotel

Address of welcome, by John Disario, metallurgist, Columbia Steel Co., Torrance, Calif.; chairman, Los Angeles chapter, American Society for Metals.

Response, by Dr. George B. Waterhouse, professor of metallurgy, Massachusetts Institute of Technology, Cambridge, Mass.; president, American Society for Metals.

"Tin Plate in the Canning Industry," by B. W. Gonser, research engineer, Battelle Memorial institute, Columbus, O.

"Application of Metals in the Chemical Industry," by F. L. LaQue, development and research engineer, International Nickel Co. Inc., New York.

"Fabrication and Application of Stainless Steels Containing Up To and Including 16 Per Cent Chromium," by Prof. Bradley Stoughton, dean of engineering, Lehigh university, Bethlehem, Pa.

"Fabrication and Application of Stainless Steels Containing 18 Per Cent Chromium and Over," by Dr. V. N. Krivobok, associate director of research, Allegheny Steel Co., Brackenridge, Pa.

2:00 P. M. —Pan-Pacific Auditorium

"Testing for Wear," by Fred Arnold, metallurgist, Kobe Inc., Los Angeles.

"New Developments and Applications of Hard Facing Materials," by C. C. Pendrell, Haynes-Stellite Co., Kokomo, Ind.

"High Tensile Structural Steels in Transportation," by A. F. Stuebing, railroad mechanical engineer, United States Steel Corp., New York.

8:00 P. M.—Pan-Pacific Auditorium

Educational Lecture

"Fundamentals of Ferrous Metallurgy," lecture No. 1, by Dr. A. Allan Bates, manager of chemical and metallurgical department, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

Tuesday, March 22

9:30 A. M.—Biltmore Hotel

Petroleum Session

"Metals Used in Petroleum Production," by H. W. McQuaid, metallurgist, Republic Steel Corp., Cleveland.

"Metals Used in Pipe Line and Pipe Line Station Construction," by L. F. Scherer, assistant chief engineer, Texas Pipe Line Co., Houston, Tex.

"Theory and Practice in Pipe Protection," by Dr. G. N. Scott, pipe line technologist, Los Angeles.

"Valves for the Petroleum Industry," by George Sherer, chief metallurgist, Merco-Nordstrom Co., Oakland, Calif.

2:00 P. M.—Pan-Pacific Auditorium

Petroleum Session

"General Application of Metals in Refining," by R. L. Wilson, metallurgical engineer, Climax Molybdenum Co., Canton, O.

"High Temperature Characteristics as Revealed by Rupture Tests," by W. G. Hildorf, chief metallurgical engineer, Timken Roller Bearing Co., Canton, O., and C. L. Clark, research engineer, department of engineering research, University of Michigan, Ann Arbor, Mich.

"Typical Failures of Still Tubes in Refinery Service," by E. C. Wright, chief metallurgist, National Tube Co., Pittsburgh.

"Alloy Steel for Tubular Oil Heaters," by R. L. Wilson, metallurgical engineer, Climax Molybdenum Co., Canton, O.

8:00 P. M.—Pan-Pacific Auditorium

Educational Lecture

"Fundamentals of Ferrous Metallurgy," lecture No. 2, by Dr. A. Allan Bates, manager of chemical and metallurgical department, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

Wednesday, March 23

9:30 A. M.—Biltmore Hotel

Mining, Smelting and Refining

"Metals Used in Production Mining Equipment," by Dr. G. B. Waterhouse, professor of metallurgy, Massachusetts Institute of Technology, Cambridge, Mass.

"Metals Used in the Smelting and Refining Processes," by R. S. Dean, chief engineer, bureau of mines, Washington.

"Metals Used in the Dredging Process," by C. M. Romanowitz, sales manager, and H. A. Sawin, assistant sales manager, Yuba Mfg. Co., San Francisco.

"A New Electro-Metallurgical Industry in the Pacific States," by R. S. Dean, chief engineer, bureau of mines, Washington.

9:30 A. M.—Biltmore Hotel

Aeronautical Session

"Metals in the Aircraft Industry," by J. R. Goldstein, research department, Douglas Aircraft Co. Inc., Santa Monica, Calif.

"Recent Developments in the Application of Magnesium Alloys to Aircraft," by A. W. Winston, metallurgist, Dow Chemical Co., Midland, Mich.

"Design and Production of Aluminum Alloy Aircraft Forgings," by A. A. Handler, manager, and L. W. Davis, technical department, forgings division, Aluminum Co. of America, Cleveland.

"Engineering Alloy Steels—S.A.E. Specifications," by Prof. Bradley Stoughton, dean of engineering, Lehigh university, Bethlehem, Pa.

2:00 P. M.—Pan-Pacific Auditorium

Aeronautical Session

"Steel Forgings for Aircraft," by Waldemar Naujoks, chief engineer, Steel Improvement & Forge Co., Cleveland.

"Stainless Steel for Aircraft," by Carl de Ganahl, president, Fleetwings Inc., Bristol, Pa.

"X-Ray Inspection of Aeronautical Materials," by T. A. Triplett, Triplett & Barton Laboratories, Burbank, Calif.

"Aluminum in Diesel Engines," by P. B. Jackson, engineering department, castings division, Aluminum Co. of America, Cleveland.

8:00 P. M.—Pan-Pacific Auditorium

Educational Lecture

"Fundamentals of Ferrous Metallurgy," lecture No. 3, by Dr. A. Allan Bates, manager of chemical and metallurgical department, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

Thursday, March 24

9:30 A. M.—Biltmore Hotel

"Economic Phase of the Metal Industry in the West," by A. N. Diehl president, Columbia Steel Co., San Francisco.

"Carbon and Low Alloy Tool Steels," by J. P. Gill, chief metallurgist, Vanadium-Alloys Steel Co., Latrobe, Pa.

"High Speed and Highly Alloyed Tool Steels," by J. P. Gill, chief metallurgist, Vanadium-Alloys Steel Co., Latrobe, Pa.

"Controlled Furnace Atmospheres," by E. E. Thum, editor, *Metal Progress,* Cleveland.

"Hardenability as It Affects Heat Treated Parts," by Dr. M. A. Grossmann, director of research, Carnegie-Illinois Steel Corp., Chicago.

2:00 P. M.—Pan-Pacific Auditorium

Machinability Session

"Machinability, Especially of Steel Screw Stocks," by J. D. Armour, metallurgist, Union Drawn Steel Co., Massillon, O.

"Machinability of Alloy Steels," by H. W. McQuaid, metallurgist, Republic Steel Corp., Cleveland.

"Machinability of All Types of Castings, Including Malleable, Gray Iron and Steel," by E. K. Smith, metallurgist, Electro Metallurgical Co., Detroit.

"Machining of Cast and Wrought Aluminum Alloys," by W. A. Dean, research metallurgist, Aluminum Co. of America, Cleveland.

5:00 P. M.—Pan-Pacific Auditorium

Educational Lecture

"Fundamentals of Ferrous Metallurgy, lecture No. 4, by Dr. A. Allan Bates, manager of chemical and metallurgical department, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

Evening Program at Biltmore Bowl

Dinner—dance and entertainment.

Friday, March 25

9:30 A. M.—Biltmore Hotel

Foundry Session

"Improvements in Steel Castings by Moderate Alloying and Heat Treatment," by F. A. Melmoth, vice president, Detroit Steel Casting Co., Detroit.

"Nickel Steels and Irons," by F. J. Walls, development engineer, and T. N. Armstrong, International Nickel Co. Inc., Detroit.

"High Chromium Steels and Irons," by E. K. Smith, metallurgist, Electro Metallurgical Co., Detroit.

"Molybdenum Steels and Irons," by W. P. Woodside, vice president, Climax Molybdenum Co., Detroit.

2:00 P. M.—Pan-Pacific Auditorium

Foundry Session

"Flame Hardening," by Dr. G. V. Slottman, research engineer, Air Reduction Sales Co., New York.

"Copper Alloys," by William Romanoff, technical superintendent, and C. O. Thieme, chief metallurgist, H. Kramer & Co., Chicago.

"Aluminum Castings," by H. J. Rowe, technical department, castings division, Aluminum Co. of America, Cleveland.

"Die Castings," by W. W. Broughton, engineer, New Jersey Zinc Sales Co., New York.

8:00 P. M.—Pan-Pacific Auditorium

Educational Lecture

"Fundamentals of Ferrous Metallurgy," lecture No. 5, by Dr. A. Allan Bates, manager of chemical and metallurgical department, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

Program of American Welding Society

Monday, March 21

9:30 A. M.—Biltmore Hotel

Symposium on Welded Oil Well Casing Strings

"Weldability and Properties of Materials for Casing Strings," by J. C. Hodge and L. H. Sadler, Babcock & Wilcox Co., Barberton, O.

"Field Practice in Welding Casing Strings," by Howard Newby, American Pipe & Steel Corp., Los Angeles.

"Physical and Economical Advantages of Welded Casing Strings."

12:00 M.—Biltmore Hotel

Luncheon Meeting

Welcome address, by E. F. Scattergood, chief electrical engineer and general manager, Los Angeles bureau of power and light, and general chairman of Western Regional conference.

Address by P. G. Lang Jr., engineer of bridges, Baltimore & Ohio railroad, Baltimore, and president, American Welding society.

Tuesday, March 22

9:30 A. M.—Biltmore Hotel

"Application and Proper Use of Hard Facing Mate-

rials," by Don Llewellyn, Air Reduction Sales Co., New York.

"Welding Cast Irons," by Prof. Gilbert S. Schaller, University of Washington, Seattle, Wash.

"Helping the Small Job Shop Welder," by J. C. Gowing, J. C. Gowing Co., Los Angeles.

"Welded Plate Construction for Machinery Bases and Substructures," by Richard Young, Bethlehem Steel Corp., Los Angeles.

Wednesday, March 23

9:30 A. M.—Biltmore Hotel

Symposium on Large Welded Pipe for Water and Power Transmission

"Problems Connected with Preparation of a Standard Code for Construction of Large Welded Pipe," by Dr. W. F. Durand, Stanford university, Stanford University, Calif.

"Shop Fabrication of Large Diameter Steel Pipe," by L. M. Muffler, Consolidated Steel Corp., Los Angeles.

"Mitigation of Corrosion in Steel Pipe Lines of the Colorado River Aqueduct," by H. P. Vail, Metropolitan Water District of Southern California.

12:00 M.—Biltmore Hotel

Luncheon Conference

Membership, programs and organization problems of the society and sections to be discussed. Warner S. Hays, managing director, American Welding society, New York, presiding.

Thursday, March 24

9:30 A. M.—Biltmore Hotel

"Design and Fabrication of High-Temperature and High-Pressure Piping," by F. C. Fantz, Midwest Piping & Supply Co., St. Louis.

"Recognizing and Repairing Weaknesses in Existing Pressure Vessels," by K. V. King and F. T. Patton, Standard Oil Co. of California, San Francisco.

"Stainless Alloy Welded Plate and Castings in Corrosion-Resisting Pressure Equipment," by Randolph Simpson, Electric Steel Foundry Co., Portland, Oreg.

"Effect of Alloy Additions Upon Welding Properties of the Chromium Steels," by Leon C. Bibber, Carnegie-Illinois Steel Corp., Pittsburgh.

7:00 P. M.—Biltmore Hotel

Dinner dance.

Friday, March 25

9:30 A. M.—Biltmore Hotel

"Design of Welded Connections in Building Construction," by Paul Jeffers, consulting structural engineer, Los Angeles.

"Resistance Welding Processes and Their Application," by Stanley Levyn, Acme Electric Welder Co., Los Angeles.

"Problems in Welding Light-Gage Materials," by J. J. Bruton, Linde Air Products Co., Los Angeles.

"Spot Welding Aircraft Materials," by C. L. Hibert, Consolidated Aircraft Corp., San Diego, Calif.

Program of American Society of Mechanical Engineers

Wednesday, March 23

9:30 A. M.—Biltmore Hotel

Hydraulics

"Centrifugal Pumps for the Colorado Aqueduct," by R. L. Daugherty, professor of mechanical engineering, California Institute of Technology, Pasadena, Calif.

"Cavitation of Centrifugal Pumps," by George F. Wislicenus, Ralph M. Watson and I. J. Karassik, Worthington Pump & Machinery Corp., Harrison, N. J.

Petroleum

"Problems in Modern Deep-Well Drilling," by Robert L. Keyes, drilling superintendent, Texas Co., Los Angeles.

"Problems in Modern Deep-Well Pumping," by C. J. Coberly, president, Kobe Inc., Los Angeles.

Process Industries

"Pressure Type Thermometer Systems," by L. G. Bean and A. Noble, Bristol Co., Waterbury, Conn.

"Pyrometers," by R. L. Goetzenberger and W. A. Rolnick, Brown Instrument Co., Division, Minneapolis-Honeywell Co., Philadelphia.

8:00 P. M.—Biltmore Hotel

Hydraulics

"Erosion of Impulse Wheel Needle Nozzles," by Prof. A. Tenot, France.

"Modern Turbine Governing," by E. E. Woodward, Woodward Governor Co., Rockford, Ill.

Petroleum

"Santa Maria and Summit Pump Stations," by Fritz Karge, Union Oil Co. of California, Los Angeles.

"Fundamentals of Design of Cracking Furnaces," by J. W. Rickerman, W. Lobo and A. L. Baker, M. W. Kellogg Co., New York, Jersey City, N. J.

General

"System Frequency Change from 50 to 60 Cycles," by C. O. West, bureau of power and light, City of Los Angeles.

"Heat Transfer Research at University of California," by L. M. K. Boelter, professor of mechanical engineering, University of California, Berkeley, Calif.

Thursday, March 24

9:30 A. M.—Biltmore Hotel

Hydraulics

"Kaplan Turbines at Bonneville," by P. L. Heslop, United States engineers corps, war department, and G. A. Jessop, S. Morgan Smith Co., York, Pa.

"Spillway Gates at Bonneville," by E. R. Miller, Tennessee Valley Authority.

Fuels

"Technique of Burning Fuel Oil and Natural Gas," by

F. G. Philo, superintendent of steam generation, Southern California Edison Co., Los Angeles.

"Combination Oil and Gas Burners," by O. F. Campbell, combustion engineer, Sinclair Refining Co., Los Angeles.

Aeronautics

"Hydraulic Press Methods—Guerin Process," by Henry E. Guerin, Douglas Aircraft Co. Inc., Santa Monica, Calif.

"Study of Dynamic Relations Between Moving Load and Structure," by R. K. Bernhard.

"Flight Velocity for Maximum Profit in Air Transportation," by Charles McLellan.

Management

"Scientific Management in Light of Present-Day Conditions," by King Hathaway, consulting engineer.

"Leadership," by A. C. Galbraith, vice president, Union Oil Co. of California, Los Angeles.

Friday, March 25

9:30 A. M.—BILTMORE HOTEL

Hydraulics

"Deep-Well Pump Testing Laboratory at University of California," by R. G. Folson, University of California, Berkeley, Calif.

"Hydraulic Jump in Slope Channels," by B. A. Bakhmeteff and A. E. Matzke, Columbia university, New York.

Applied Mechanics

"A New Relationship for Use in Design of Machine Columns," by Prof. W. H. Clapp, professor of mechanism and machine design, California Institute of Technology, Pasadena, Calif.

"Fluid Problems of Ocean Circulation," by H. U. Sverdrup, director, Scripps Institute of Oceanography, Claremont, Calif.

General

"Mechanical Problems in Design of Diesel Tractors," by C. G. A. Rosen, Caterpillar Tractor Co., San Leandro, Calif.

"Mechanical Problems of the 200-Inch Telescope," by Michael Karelitz, California Institute of Technology, Pasadena, Calif.

Exhibitors in Western Metal Exposition

Pan-Pacific Auditorium, Los Angeles, March 21-25

A

Abegg & Reinhold Co. Ltd., Los Angeles.....B-39
Heat treatment of steel and oil well tools.

ABRASIVES, Cleveland B-46
Publications and technical books.

Air Reduction Sales Co., New York G-27
Oxyacetylene cutting and welding apparatus and supplies; flame hardening; hard facing.

American Bridge Co., Pittsburgh E-36
Electric furnaces.

American Car & Foundry Co., New York E-15
Electric bar, forging and rivet heaters.

American Gas Furnace Co., Elizabeth, N. J..Gas Section
Gas heat treating furnaces.

American Steel & Wire Co., Cleveland E-36
Carbon, alloy and stainless steel wire; bars and strip.

Armstrong-Blum Mfg. Co., Chicago H-36
Metal band sawing machines; hacksaws.

Axelson Mfg. Co., Los Angeles.....G-20
Lathe; pumps; sucker rods; tools; gages.

B

Baker Oil Tools Inc., Los Angeles.....H-11
Oil tools.

W. O. Barnes Co. Inc., Detroit F-16
Hack saw machine blades.

Bastian-Blessing Co., Chicago G-54
Oxyacetylene welding and cutting equipment.

Bethlehem Steel Co., Bethlehem, Pa.....E-18
Carbon, alloy and corrosion-resisting steels.

Bristol Co., Waterbury, Conn.....E-11
Temperature control instruments.

Brown Instrument Co., Philadelphia E-10
Temperature control instruments.

C

Andrew C. Campbell Division, American Chain & Cable Co., Bridgeport, Conn.....E-42
Abrasive cutoff machines; nibbling machines.

M. E. Canfield Co., Los Angeles G-6, F-5
Industrial lifting equipment; tube couplings; fittings and valves.

Carnegie-Illinois Steel Corp., Pittsburgh.....E-36
Carbon, alloy, high-tensile and stainless steels.

Clark Tructractor Division, Clark Equipment Co., Battle Creek, Mich. D-9
Gasoline industrial lift trucks.

Climax Molybdenum Co., New York H-41
Molybdenum alloy steels and irons.

Coffing Hoist Co., Danville, Ill. B-45
Hoisting equipment.

Columbia Steel Co., San Francisco.....E-36
Carbon, alloy, high-tensile and stainless steels.

Continental Machine Specialties Inc., Minneapolis..A-44
Precision filing, sawing and polishing machines.

Cook Heat Treating Co., Los Angeles.....H-6
Commercial heat treating.

Crucible Steel Co. of America, New York E-2
Tool steels, stainless and corrosion-resisting steels.

Cyclone Fence Co., Waukegan, Ill. E-36
Steel fence; wire products.

D

DAILY METAL TRADE, Cleveland B-46
Publications and technical books.

Delta Mfg. Co., Milwaukee D-41
Metal and wood working machinery.

Department of Water and Power, Los Angeles F-54
Service provided by this company.

Henry Disston & Sons Inc., Philadelphia E-45
Tool steels; saws; files; knives; steel.

Dow Chemical Co., Midland, Mich. F-44, F-46
Magnesium alloys.

Ducommun Metals & Supply Co., Los Angeles F-36
Steel products.

E. I. duPont deNemours & Co., R & H Chemicals Department and Grasselli Division, Wilmington, Del. F-11, F-15
Plating chemicals; pickling inhibitors; cyanide; chemicals.

E

Eclipse Fuel Engineering Co., Rockford, Ill. . Gas Section
Gas heat treating furnaces; burners; controls.

Electric Steel Foundry Co., Portland, Oreg. G-11
Steel castings.

Electro Metallurgical Co., New York D-45, D-47
Alloying elements for iron and steel.

Emsco Refractories Co., Los Angeles C-12
Refractories.

F

Farrar Industrial Products Co., Los Angeles H-6
Quenching oils; carburizing compounds; heat treating supplies.

Fostoria Pressed Steel Co., Fostoria, O. G-40
Pressed steel products.

THE FOUNDRY, Cleveland B-46
Publications and technical books.

Foxboro Co., Foxboro, Mass. E-46
Temperature control instruments.

G

General Electric Co., Schenectady, N. Y. C-41, C-47
Electric furnaces; electric welding machines.

General Gas Light Co., Los Angeles ..... Gas Section
Industrial heating.

General Metals Corp., Los Angeles C-36
Forgings and castings.

Grob Bros., Grafton, Wis. E-54
Metal cutting band saws; filing machines.

H

Halcomb Steel Co., Syracuse, N. Y. E-2
Tool steels; alloy steels.

Harnischfeger Corp., Milwaukee B-15
Arc welders; welding electrodes; electric hoists.

Harron, Ricard & McCone, Los Angeles H-40
Machinery.

Haynes-Stellite Co., Kokomo, Ind. D-45, D-47
Cutting tools; wear and corrosion-resistant alloys.

Hevi Duty Electric Co., Milwaukee D-42
Electric heat treating furnaces.

I

Illinois Testing Laboratories Inc., Chicago C-10
Temperature control instruments; thermometers; meters.

International Nickel Co. Inc., New York H-21
Nickel and nickel alloys.

J

Jensen Instrument Co., Los Angeles D-7
Temperature control instruments.

Earle M. Jorgensen Co., Los Angeles H-31, H-37
Alloy, tool, stainless and hollow drill steels.

K

Kay-Brunner Steel Products Inc., Alhambra, Calif. C-40
Steel castings.

Kinney Iron Works, Los Angeles E-43
Gray iron castings.

James H. Knapp Co., Los Angeles .... C-6, Gas Section
Heat treating furnaces.

L

Leeds & Northrup Co., Philadelphia H-19
Electric heat treating furnaces; temperature controls.

E. Leitz Inc., New York E-39
Photomicrographic apparatus.

Lewis-Shepard Co., Boston G-6, F-5
Industrial lifting equipment.

Lincoln Electric Co., Cleveland F-20
Arc welders; electrodes; motors.

Lindberg Engineering Co., Chicago A-41, A-45
Heat treating furnaces; control equipment.

Linde Air Products Co., New York D-45, D-47
Oxyacetylene welding and cutting apparatus.

Los Angeles Steel Castings Co., Los Angeles C-16
Steel castings.

Ludlum Steel Co., Watervliet, N. Y. H-1
Tool, alloy and stainless steels; castings.

Lufkin Rule Co., Saginaw, Mich. G-40
Machinists' tools and supplies.

M

MACHINE DESIGN, Cleveland B-46
Publications and technical books.

Machinist's Tool & Supply Co., Los Angeles G-40
Machinists' tools and supplies.

Marquette Mfg. Co., Minneapolis F-2
Tools.

Maxon Premix Burner Co., Muncie, Ind. ... Gas Section
Oil and gas burners; blowers.

Metallizing Co. of America Inc., Los Angeles B-9
Metal spraying equipment.

Meyer Machinery Co., Los Angeles D-11
Punching and shearing machines.

Minneapolis-Honeywell Regulator Co., Minneapolis E-10
Temperature control instruments.

N

National Carbide Corp., New York G-27
Carbide.

National Engineering Co., Chicago C-2
Foundry equipment.

National Tube Co., Pittsburgh E-36
Steel pipe and tubing.

National Twist Drill & Tool Co., Detroit G-40
Twist drills; milling cutters; reamers; hobs.

Natural Gas Bureau, Los Angeles ..... Gas Section
Industrial gas equipment.

Norton Co., Worcester, Mass. F-36
Grinding wheels; abrasives; refractories.

O

Oakite Products Inc., New York A-50
Cleaning materials and processes.

P

Pacific Coast Gas Association, San Francisco ..... Gas Section
Industrial gas equipment.

Pacific Foundry Co. Ltd., San Francisco.....G-15
Gray iron and aluminum castings.

Pacific Gas Radiator Co., Los Angeles.....Gas Section
Industrial gas equipment.

Pacific Metals Co., San Francisco.....H-20
Nickel and monel castings.

Pacific Scientific Corp., Los Angeles.....D-42
Heat treating equipment.

Pangborn Corp., Hagerstown, Md. C-2
Blast cleaning and dust collecting equipment.

Paramount Mfg. Co., Los Angeles.....Gas Section
Industrial gas equipment.

Parker Appliance Co., Cleveland G-5
Tube couplings; fittings; valves.

Partlow Corp., New Hartford, N. Y.....C-6
Temperature controls; valves.

Payne Furnace & Supply Co., Beverly Hills, Calif. .....Gas Section
Industrial gas equipment.

Penton Publishing Co., Cleveland.....B-46
Publications and technical books.

Q

Quigley Co. Inc., New York D-2
Refractories; insulation; cement.

R

Reeves Pulley Co., Columbus, Ind. F-40
Variable-speed control equipment.

Reliance Regulator Corp., Alhambra, Calif.....F-12
Gray iron castings.

Republic Steel Corp., Cleveland.....C-27
Alloy and stainless steels; sheets; bolts and nuts.

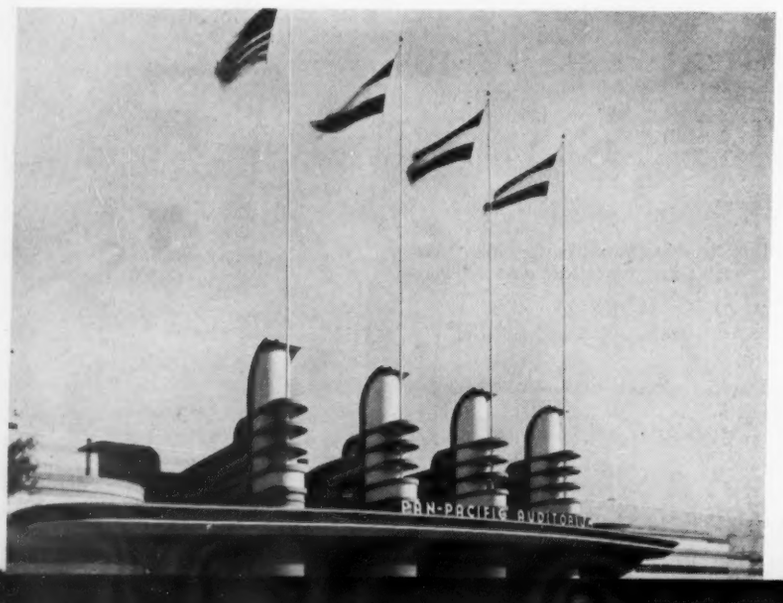
S

Scully Steel Products Co., Chicago.....E-36
Alloy, high tensile and stainless steel.

Simplicity Engineering Co., Durand, Mich.....C-2
Foundry equipment.

Smith-Booth-Usher Co., Los Angeles.....E-42
Machine tools and machinery.

Built in 1935, the modernistic and attractive Pan-Pacific auditorium in Los Angeles affords 100,000 square feet of exhibit space. Nearly all of this will be required for the Western Metal exposition, March 21-25



Snyder Foundry Supply Co., Los Angeles C-2
Foundry equipment and supplies.

Southern California Edison Co., Los Angeles.....D-54
Industrial electric heating.

Southwest Purchasing Agents Association, Los Angeles B-43
Educational exhibit.

Spencer Turbine Co., Hartford, Conn.....D-5
Turbocompressors; vacuum cleaners.

Spindler & Sauppe, Los Angeles.....E-39
Photomicrographic apparatus.

Standard Oil Co. of California, Los Angeles.....C-54
Lubricating oils and greases.

L. S. Starrett Co., Athol, Mass.....G-40
Machinists' tools and supplies.

STEEL, Cleveland B-46
Publications and technical books.

Stoody Co., Whittier, Calif. C-20
Hard surfacing materials; welding rods; grinders.

Stuart Oxygen Co., San Francisco.....G-54
Oxyacetylene welding and cutting equipment.

Sunnen Products Co., St. Louis E-9
Grinders; hones; tools.

Surface Combustion Corp., Toledo, O. .....Gas Section
Heat treating furnaces; burners; accessories.

T

Tennessee Coal, Iron & Railroad Co., Birmingham, Ala. E-36
Steels; bars; shapes.

Henry G. Thompson & Son Co., New Haven, Conn..H-39
Hack saw blades.

Timken Roller Bearing Co., Canton, O. D-36
Alloy steels; tubing; roller bearings.

Toledo Pipe Threading Machine Co., Toledo, O.....B-54
Pipe threading machines.

Tool Steels Inc., Los Angeles.....E-45
Tool steels; saws; files; knives; steel.

Turco Products Inc., Los Angeles.....A-8
Cleaning materials and processes.

U

Union Carbide & Carbon Corp., New York..D-45, D-47
Welding and cutting equipment; ferroalloys; heat and corrosion-resisting alloys.

United States Spring & Bumper Co., Los Angeles..H-46
Springs; automobile bumpers; highway guards.

United States Steel Corp., Pittsburgh.....E-36
Carbon, alloy, high tensile and stainless steels.

V

Victor Equipment Co., Victor Welding Division, Los Angeles C-41, C-47
Welding and cutting equipment.

W

Western Precipitation Co., Los Angeles.....C-46
Mining equipment.

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. E-47, F-48
Electric welding equipment; electric furnaces.

Wheelco Instruments Co., Chicago.....D-7
Temperature control instruments.

Wilson Welder & Metals Co. Inc., North Bergen N. J. G-27
Electric welding machines.

Winter Bros. Co., Wrentham, Mass. G-40
Tools.

Powder Metallurgy Symposium Features A. I. M. E. Meeting

■ POWDER METALLURGY and the evolution of gases and distribution of metalloids in rimmed-steel ingots were prominent topics for discussion at sessions of the iron and steel division and institute of metals division, 148th meeting, American Institute of Mining and Metallurgical engineers, New York, Feb. 14-18.

Two symposiums covering powder metallurgy were held and several papers presented on various gas and metalloid factors entering into production of rimmed steel ingots.

Hard tool materials produced by processes of powder metallurgy from hard carbide constituents and matrices of iron, nickel or cobalt, or alloys of these materials with tungsten, or tungsten and carbon, were reviewed by Philip M. McKenna, vice president, Vanadium-Alloys Steel Co., Latrobe, Pa., in discussing tantalum carbide tool compositions. While hardness is a property of greatest practical interest in tool materials, the term is a generalized one, lacking definiteness unless a specific test is applied, according to Mr. McKenna.

Cemented carbide compositions are the latest addition to hard tool ranks, which in their development have included carbon tool steels, Mushet steel, high-speed steels, stellites and others. Outlining tests as to hardness, strength, elasticity, thermal conductivity, Mr. McKenna gave illustrations of general desirable properties.

Provides Valuable Materials

Powder metallurgy has provided tool materials of great value in mechanical work and has extended range of materials that may be used in construction of durable steels and other metals previously avoided because of the difficulty in machining. Tantalum carbide, as previously prepared by the carburization of tantalum metal or by heating tantalum oxide with carbon, approached but never equalled the monatomic ratio of carbon to tantalum of 6.22 per cent C in the carbide, nor did it have the density of 14.48, of macrocrystalline tantalum-carbon produced under a menstruum metal, according to Mr. McKenna.

Density Is Estimated

A menstruum metal is one dissolving both carbon and tantalum, permitting the formation of tantalum-carbon from these atoms in the liquid phase. Density of tantalum-carbon materials was thought to be 13.95 to 14.05. Examination of these carburized substances containing tantalum and carbon always showed that they were mechanically separable, as by "panning" with liquids, into a small amount of free carbon and a material comprising less than 6.224 per cent carbon. If more carbon than 6.224 per cent was present in the substances, as by admixing with carbon and heating, even repeatedly, excess carbon was always removable by mechanical means, leaving a substance lower than 6.22 per cent.

Importance, from the standpoint of powder metallurgy of tantalum-carbon compositions, was that a small deficiency of carbon in the materials resulted in lower break strength in composition. It is significant, Mr. McKenna said, that free tantalum in the alloy matrix does the same thing, and definitely should be avoided, as the utility of tool materials depends on a desirable combination of strength and hardness. Also, a higher ratio of tungsten to cobalt or nickel in matrix alloy is desirable because of its stiffness at elevated temperatures, and when free tantalum is picked up in this alloy it is rendered brittle, whereas when TaC, prepared under a menstruum metal, is employed, high percentage of tungsten in the matrix may be used with concomitant high break strength and resistance to deformation of tool temperatures when cutting.

Cemented tungsten carbide alloys were discussed by W. P. Sykes, General Electric Co. Results of alloying tungsten carbides with co- were reviewed. Machining of alloys never before possible is now practical by the use of tungsten carbide materials. It is thus possible to study properties of some metals at extremely high pressures.

C. W. Balke, Fansteel Metallurgical Corp. gave a paper on ductile tantalum, columbium and molybdenum, describing methods of separating tantalum and columbium from the ores in which they occur together. Tantalum is being used increasingly in chemical industries to resist highly corrosive liquids, and also in the rayon industry in die material for the forming of threads.

Powder metallurgy is finding many new applications in industry, Charles Hardy, president, Charles Hardy Inc., said mentioning especially the lamp industry which uses tungsten wire produced by pressing powdered tungsten after its reduction from the oxide. Compressed at high pressures, around 50 tons per square inch, such powders can be sintered below the fusion point. For such use of tungsten wires, purity, size and pressure must be closely controlled. Among articles now produced by these methods, Mr. Hardy stated, were resistors, electrical contacts, bearings, thermostatic elements, electrical brushes, magnets, welding electrodes, electrical cores, rare metal parts and cutting tools.

Many Special Applications

Offering a wide field for development, Gregory J. Comstock, Handy & Harman, New York, gave numerous special applications of powder metallurgy, including highly refractory metals, difficult to cast, tungsten being an example; combination of some metal aggregates and retaining their individual properties, cemented carbides; for composite properties as in porous bearings and for special shaping and forming for definite structural effects, but difficult to cast.

Some processes in powder metallurgy require powders of definite physical, as well as chemical characteristics, according to a paper by D. O. Noel, J. D. Shaw and E. B. Gebert, Metals Disintegrating Co., Elizabeth, N. J. For such methods the material may be spherical, crystalline, flake-like or spongy. Various methods of powdering metals were given as: Mechanical milling or grinding, shotting as in pouring molten lead through orifices into cold water, atomization into cold atmospheres, distillation with

controlled condensation, reduction of oxides, the Mond process, electrodeposition, removal of one metal from a two-component alloy by solution.

A paper by J. W. Halley and T. S. Washburn, metallurgists, Inland Steel Co., Indiana Harbor, Ind., was declared the best discussion published on steel research during the year. Medals were awarded them for their work—distribution of metalloids in rimmed-steel ingots being the subject.

While rimming steels represent a substantial portion of the total volume of plain carbon steel produced, a detailed study of the distribution of carbon, manganese, sulphur and phosphorus in such ingots and their segregation has been lacking. The rimmed ingot, split by dynamiting, reveals several zones in the ingot differing in structure and composition.

Check Skin Metal

Messrs. Halley and Washburn found the skin metal is that chilled by the mold wall. There are no blowholes in this zone because of its rapid cooling. It has practically the same composition as liquid metal. Rim zone consists of metal that solidifies while top of ingot is open and rolling action is in progress. It contains lenticular blowholes in the lower portion and consists of purer metal than the core. Blowholes in the rim are called primary because they are first to form during solidification of the ingot. Secondary blowholes are formed by gases trapped when rimming action stops, and separate the rim and core. Core zone consists of the metal that solidifies after rimming action stops. Core zone contains scattered blowholes and the least pure metal in the ingot.

In studying distribution of carbon it was found that, near top of ingot, carbon decreases uniformly from surface to secondary blowholes. At secondary blowholes, dividing the rim and core zone, there is a pronounced increase in carbon to about 0.04 per cent. Also, from secondary blowhole zone to center of ingot, carbon increases rather rapidly in comparison. At center of the ingot and 85 per cent above the bottom of the structure, carbon reaches a maximum of 0.19 per cent. At half the ingot height, carbon is slightly lower near surface, decreasing slightly through rim zone. Concentration of carbon is constant at about 0.07 per cent across the core. There is an increase of about 0.03 per cent at secondary blowholes. At a point 10 per cent above the bottom, carbon is uniform across the ingot at approximately 0.05 per cent. Average ladle analysis of heats used in investigation was: Carbon, 0.09 per cent; manganese, 0.40 per cent; phosphorus, 0.009 per cent and sulphur, 0.025 per cent. Molds were 67 inches high by 24 x 43 inches.

Decreasing from surface to secondary blowholes, distribution of manganese is much more uniform than that of carbon in rimmed ingots. From 0.06 per cent near top of ingot, manganese decreases to about 0.02 per cent at bottom. At 85 per cent of ingot height at the secondary blowholes there is an increase, 0.09 per cent with 0.03 per cent at 50 per cent of the ingot height. A low-manganese area also prevails in lower part of core zone, less than the concentration in adjacent rim zone.

Maximum Sulphur at Center

Sulphur concentration is near uniform at the rim zone at 0.020 per cent, with a pronounced increase at secondary blowholes, 0.020 per cent at the ingot top to 0.008 at the bottom. Sulphur reaches a maximum at center of ingot at 85 per cent of ingot height and at this point the steel contains 0.100 per cent. At the half point in ingot height, concentration of sulphur is uniform across core zone. Near the bottom it decreases slightly in the core between secondary blowholes and center. Analysis of steel used was low in phosphorus, making it difficult to obtain consistent data, but previous investigations with high phosphorus steels indicate distribution of this material is similar to that of sulphur established in the Halley-Washburn research.

"The marked difference in the distribution of carbon, manganese and sulphur indicates different mechanisms controlling the distribution of the three elements," Messrs. Halley and Washburn say, in elaborating on the factors governing normal distribution.

Reaction of carbon with ferrous oxide in the steel is the most important reaction that occurs during rimming and would be expected to control distribution of carbon in the rim zone, they claim. The decrease in carbon across the rim near the top of the ingot indicates that the concentration of ferrous oxide in the liquid steel at the solid liquid interface increases as the rimming proceeds. Near bottom of ingot the pressure exerted by the liquid steel is nearly high enough to suppress reaction between carbon and ferrous oxide. Presence of primary blowholes indicates some has evolved, but uniform carbon content across bottom of ingot shows little carbon is removed. It is probable gas evolution is so slow that the bubbles are trapped between the growing dendrites. In the core zone distribution is similar to that found in a killed steel and is controlled by rate of cooling, distance between liquidus and solidus of the iron-carbon system, and by rate of diffusion of carbon in solid iron. Average decrease in carbon between ladle and solid ingot is about 0.02 per cent.

Concentration of manganese shows a drop across the rim zone similar to that shown by carbon—probably the result of the same change in concentration of ferrous oxide during rimming, Halley and Washburn say. As the product of reaction of manganese and ferrous oxide is a solid rather than a gas, reaction is affected little by pressure, and distribution in rim zone changes little between top and bottom of ingot. Manganese oxide formed is carried to top of ingot by the rising stream of molten steel and gas found on top of the ingot. Manganese is also removed with sulphur as manganese sulphide. When ingot is capped, distribution of manganese is determined by factors that control distribution in killed steel and by action of remaining manganese oxide. As particles of manganese oxide have low density, they will rise until steel in the core zone freezes. This removes manganese from bottom of core zone and results in the low-analysis area.

Distribution Unaffected

Distribution of sulphur is not affected by ferrous oxide content of the molten metal. Therefore there is virtually no change in concentration of sulphur across the rim zone, they conclude. There is a slight increase in sulphur from the surface of secondary blowhole zone but this increase amounts to only 0.003 per cent at top of ingot and less than 0.001 per cent at the bottom. It is probably caused by the increasing sulphur in the molten metal during freezing. Elimination of sulphur from the rim zone is, perhaps, largely mechanical. The immiscible manganese sulphide is swept away by the rising stream of gas and molten steel. Distribution of sulphur in core zone is probably determined by ejection of manganese sulphide by the freezing steel, but the quiet molten metal does not permit elimination of the manganese sulphide in the same manner as in the rim zone. There is enough progressive concentration to make the last metal that solidifies much higher than the rest of the core. There is some increase in concentration of sulphur toward top of ingot, resulting from tendency of the manganese sulphide to rise in the molten steel. Sulphur removed during rimming so overshadows this process that there is no low-sulphur area in bottom of core zone similar to that shown by manganese. On furnace practice effects they say:

"There are so many variables in furnace practice, deoxidation and pouring practice that it is extremely

difficult to determine the effect on distribution of any one of the variables. The effect of some changes in practice, such as ingot height, can be determined definitely by varying the practice in different ingots in the same heat. Other factors, such as iron oxide content of the furnace slag, are liable to be overshadowed by other variables and their effect on distribution is very difficult to determine. The factors affecting distribution will be discussed in the order in which their effect can be most definitely determined.

"Pouring the ingots higher raises the point of maximum analysis higher in the ingot. An increase of from 67 to 84 inches in ingot height raised the analysis peak from 85 to 88 per cent of the ingot height. In the taller ingots the peak will be sharper and give a higher extreme concentration than in shorter ingots.

"Low pouring temperatures give peaks of higher concentration in the distribution curves than high pouring temperatures. With high pouring temperatures there is a sharp drop in carbon and manganese through the rim from the edge of the ingot to the secondary blowholes. With low pouring temperatures there is little or no drop in analysis across the rim.

"Capping the ingot early reduces the width of the rim zone but does not alter the distribution within the rim and core zone. Late capping increases the width of the rim zone and raises the analysis throughout the core zone, but has little effect on the relative distribution within the core zone.

"Ingots that rim in flat or rise slightly during rimming have peaks of higher concentration than ingots that drop slightly during rimming.

"Heats that are underoxidized in the furnace have very sharp peaks of high concentration and the area of uniform analysis in the core extends high in the ingot."

Gas Evolution Discussed

Evolution of gases from rimming ingots was discussed by Prof. John Chipman, Massachusetts Institute of Technology, who worked with K. C. McCutcheon, assistant general superintendent, American Rolling Mill Co., Middletown, O., in the research. Connecting a pipe at the hood of the rimmed ingot, gases were collected and delivered to a sampling valve and meter for analysis on various types of steel up to 0.087 carbon. Analysis revealed up to 90 per cent carbon monoxide in numerous tests with copper-bearing steels not changing the ratio to much extent. Gas ratios, however, are in relation to carbon contents of the heats with higher carbons evolving less quantities of gas. The total volume of gas evolved in the pouring and rimming an ingot, depending naturally on physical factors, varies from 50 to 100 cubic feet, the mid-point in the ratio predominating. Addition of small quantities of aluminum slows down gas evolution, but doesn't apparently reduce the actual volume of gas evolved.

Dr. Frederick Mark Becket, president, Union Carbide & Carbon Research Laboratories, Inc., and vice president, Electro Metallurgical Co., New York, delivered the annual Howe Memorial lecture, the 15th in the series, taking for his topic, "On the Allotropy of Stainless Steel."

The demonstration that stainless steels are quite analogous to plain carbon steels in many ways with respect to allotropic changes during cooling, a theory explaining the occasional intercrystalline corrosion attack suffered by some stainless steels, and discussions of new constituents recently recognized in stainless steels and their significance in the commercial utilization of these widely useful alloys was described by Dr. Becket.

Dr. Becket, who personally had a large share in the discovery and development of high-chromium steels both of the heat-resistant and of the stainless type, described in his lecture the more recent advances in substituting manganese for all or for part of the nickel in the non-magnetic types of stainless steels, and explained the role of Columbium in stainless steel.

New types of stainless steels are those of mixed structures in which both the non-magnetic and magnetic forms of iron or iron-chromium exist.

A new structural constituent, a so-called sigma-phase, was discussed by Dr. Becket and its presence correlated with an observed peculiarity of some steels of this class in exhibiting what has been called a "475 degree brittleness." Nitrogen also is shown to be taking an important place in the composition and properties of stainless steel.

Dr. Becket urged the combined study of these several phases of the constitution and properties of stainless steels in order to still further develop the unusually useful properties, strength ductility relationship, ease of fabrication, and resistance to corrosion of this class of alloy steels.

Alloy Cast Irons Subject at Detroit

■ Alloy cast irons comprised the subject material for an address by A. L. Boegehold, chief metallurgist, General Motors Research Laboratories, Detroit, at the February meeting of the Detroit chapter of the American Foundrymen's association held Feb. 17 at the Fort Shelby hotel, with approximately 100 in attendance.

Preceding Mr. Boegehold's presentation were four roundtable discussions on phases of foundry practice. Harry Rayner, Dodge division of Chrysler Corp., led a discussion on cupola operations; J. H. Crowley, foundry department of Pontiac Motor division of General Motors Corp., dealt with gray iron molding and coremaking; Fred Walls, Detroit office of International Nickel Co. Inc., directed attention to hardeners and softeners for cast iron; and J. W. Colling, Aluminum Co. of America, Detroit, took charge of the roundtable on nonferrous molding and melting.

Defining alloy cast iron as a cast iron to which sufficient alloy addition has been made to produce an appreciable change in properties in the size section for which the iron is to be used, Mr. Boegehold pointed out that physical properties are reflections of the microstructure which in turn is governed by the amount of iron carbide (Fe_3C) which has decomposed.

Cooling rate was likened to a valve which determines how far this decomposition proceeds, and the various alloying elements contribute either to the stabilization or destabilization of the iron carbide. Thus each alloy may be considered to have a certain "graphitizing pressure." In general there are two classes of alloys—one which tends toward stabilization of carbide or chill producing, and the other tending toward destabilizing or chill restraining.

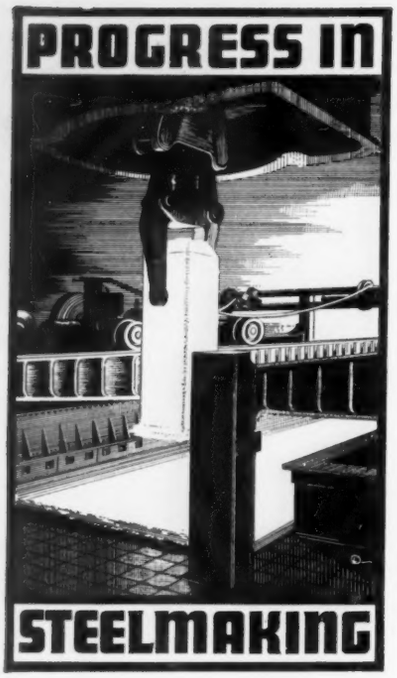
In the first class are such alloys as vanadium, chromium, molybdenum, etc.; in the second such materials as copper, nickel, aluminum, etc. Mr. Boegehold presented slides illustrating the effects of the various alloys on microstructures and physical properties.

In summation, alloys exert three main effects on physical properties—stabilizing or destabilizing the carbide; regulation of graphitic structure, and control of matrix.

Hat Protects Workmen

■ A hat, designed for protection of workmen against falling or flying objects, has been placed on the market by Mine Safety Appliances Co., Thomas, Braddock & Meade streets, Pittsburgh.

The headpiece, which is styled much like that of the army trench helmet, is made of airplane metal and corrugated to provide resistance to blows. It is light in weight and claimed not to absorb heat even when worn in the direct sunlight. Leather headband is spaced from the duralumin shell to allow air circulation. This band and the cradlestraps can be easily replaced.



Lean Ores

New stack now under construction in Scunthrope district, England, will smelt lowest grade iron ore used commercially in large quantities in any place in the world

PART I

By WM. A. HAVEN
Vice President
Arthur G. McKee & Company
Cleveland

From a paper presented before the Eastern States Blast Furnace and Coke Oven association, Pittsburgh, Feb. 11

■ This paper is chiefly concerned with a description of a complete new blast furnace plant that is now being designed and built by Arthur G. McKee & Company, Cleveland, for the Appleby-Frodingham Steel Co. Ltd., a division of the United Steel Companies Ltd., at Scunthrope, in England.

Scunthrope is in Lincolnshire, about 35 miles due north of the famous old Cathedral City of Lincoln and about 150 miles north of London. It is cut off from a direct route to the north of England by the wide tidal measures of the Humber River, and is consequently not on any main line railway. The nearest important railway center is Doncaster, 25 miles to the west, with which it is connected by a branch of the L. & N. E. railway that dead ends approximately 30 miles away on the North Sea at Grimsby. Grimsby is said to be the greatest fishing port in the world, so this part of England is probably better known for its shipments of fish than of pig iron.

Nevertheless, Scunthrope is entitled to a high rank in the British world of iron and steel, being second only to the older Cleveland district on the North East Coast, from the standpoint of production. Of 7,721,400 tons of pig iron produced in 1936, as shown in Table I, 1,023,200 tons came from Lincolnshire. Of 8,760,600 tons of steel ingots, Scunthrope's share was 1,168,800 tons, or 13.3 per cent. The principal plants are those of the Appleby-Frodingham Co., John Lysaught Ltd. and Richard Thomas & Co.

The Appleby-Frodingham plant, after completion of the present building program, which includes additions to the Appleby melting shop, will probably be the largest single ingot producing unit in the Empire. As an indication of the high quality and general utility of Scunthrope steel products, it might be mentioned that Appleby-Frodingham specialize in the production of plates, structural shapes and merchant bars; Lysaught in sheets and the Thomas company in tin plate.

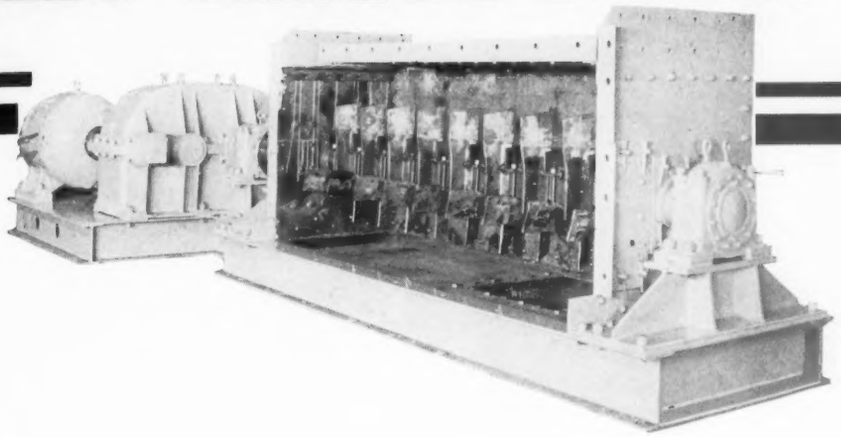
Of still greater distinction to the

Table I
Iron Ore Consumed in the Production of Pig Iron by Districts, 1936*
(In Thousands of Tons)

District	Production of Pig Iron and Ferroalloys	Hematite and Basic Iron	Source of Home Ore Consumed: West Coast Hematite	North Lincs.	Cleveland	South Lincs., Leicester, Northants, Oxford	Other Districts	Total	Imported Ore Consumed	Per cent
1 Derby, Leicester, Notts., Northants and Essex	1,698.5	598.1	0.8	198.8	.....	3,863.4	0.2	4,063.2	517.2	11.3
2—Lancs. (other than 10), Denbigh, Flint and Cheshire	460.1	344.4	2.9	305.4	.....	460.5	4.6	773.4	229.3	22.5
3 & 9—Yorks. (including Sheffield) other than 5										
4—Lincolnshire	1,023.2	1,001.3	.....	2,347.7	.....	867.5	.....	3,215.2	201.5	5.9
5—Northeast Coast	2,116.6	1,999.6	41.9	.....	1,830.7	452.9	.....	2,325.5	2,264.3	49.5
6—Scotland	471.1	299.0	12.2	.....	.....	.....	19.9	32.1	733.6	95.5
7—Staffs., Shrops., Worcester and Warwick	433.7	377.6	2.3	1.4	.....	505.8	187.8	697.3	126.2	15.4
8—South Wales and Mon.	750.8	749.9	.....	.....	.....	300.3	218.2	518.5	930.8	64.2
10—Northwest Coast	767.4	700.8	903.3	.....	.....	.....	.....	903.3	484.0	34.8
Total	7,721.4	6,070.7	963.4	2,853.3	1,830.7	6,450.4	430.7	12,528.5	5,486.9	30.4

*From "Statistics of the Iron and Steel Industries," British Iron and Steel Federation.

The American



Manufactured in Three Sizes:

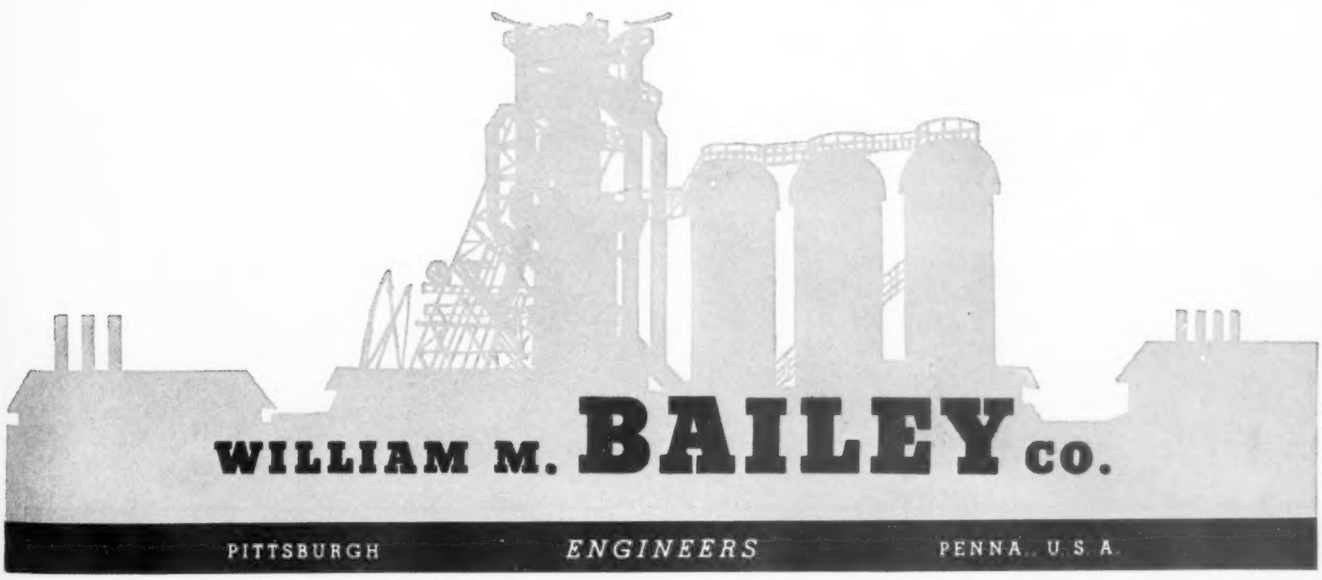
100 to 150 Tons per hour
200 to 300 Tons per hour
400 to 500 Tons per hour

Sintering Plant Pug Mill

The severe, abrasive action of mixing the various materials used in sintering at the Steel Works Sintering Plant has always proved a maintenance problem to those employing light and inferior constructed equipment. Pug mills intended for service of this nature *must* be of rugged design, efficient for long periods of continuous operation without repairs and must possess an overall simplicity for ease of inspection.

THE AMERICAN SINTERING PLANT PUG MILL (illustrated) is a perfection of engineering skill based upon the experience of many years with the blast furnace and associated industries. This mill pugs a mixture of 50% ore concentrates, 25% flue dust and 25% sinter fines weighing approximately 145 lbs. per cubic foot with 5% moisture. Of the three capacity sizes built, all have proven most efficient on this mix. The mill is so designed that the paddle shaft may be readily checked and paddles replaced if necessary. Paddles being made of either structural material with a stellite face or manganese steel castings. The original mill, in operation since 1931, has shown a marvelous job on a 200 tons per hour capacity—handling all the material going into a double strand sintering plant.

General specifications and operating literature will be mailed upon application.



WILLIAM M. BAILEY CO.

PITTSBURGH *ENGINEERS* PENNA., U. S. A.

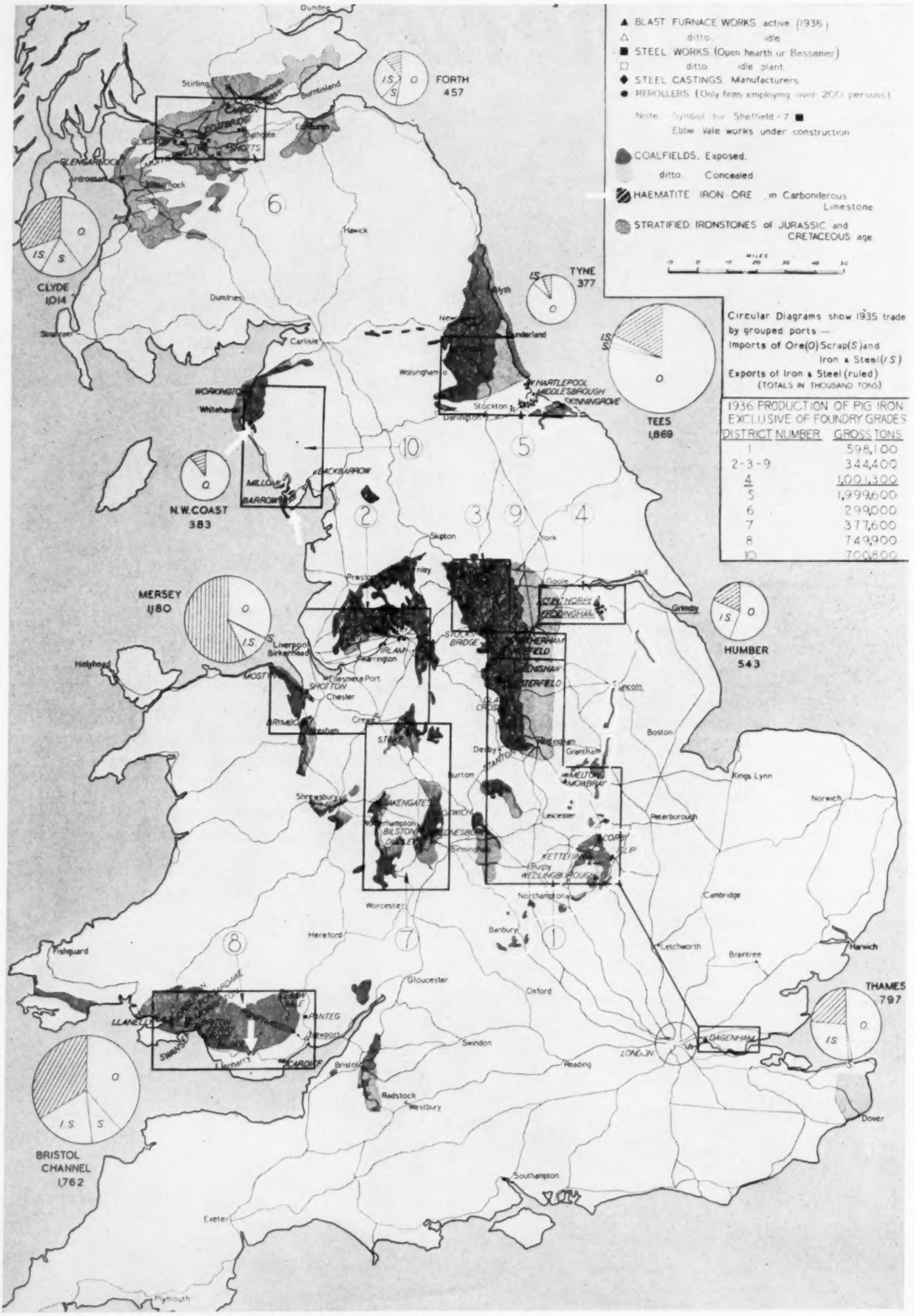


Fig. 1—Iron ore and coal deposits and principal iron and steel manufacturing districts of Great Britain

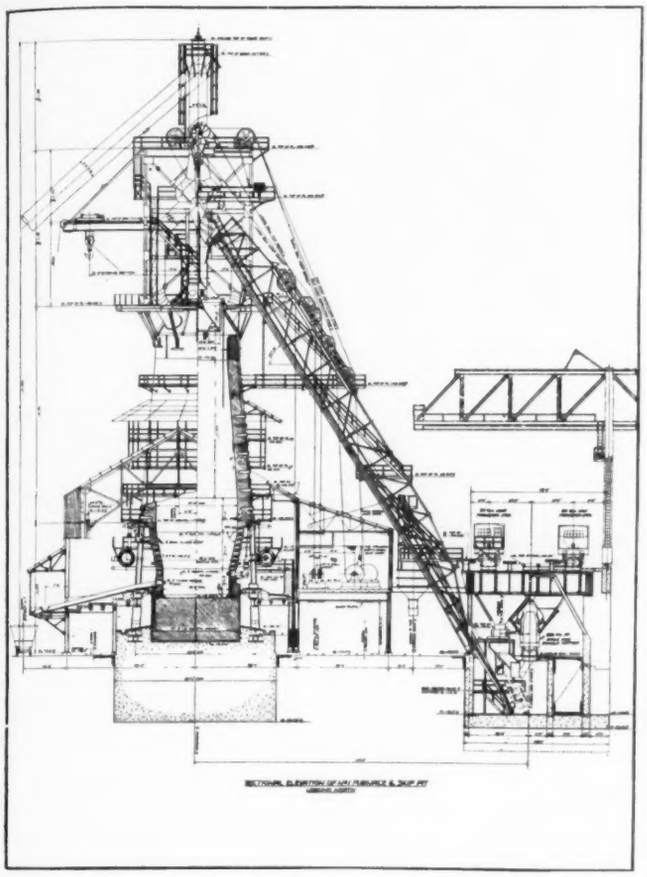


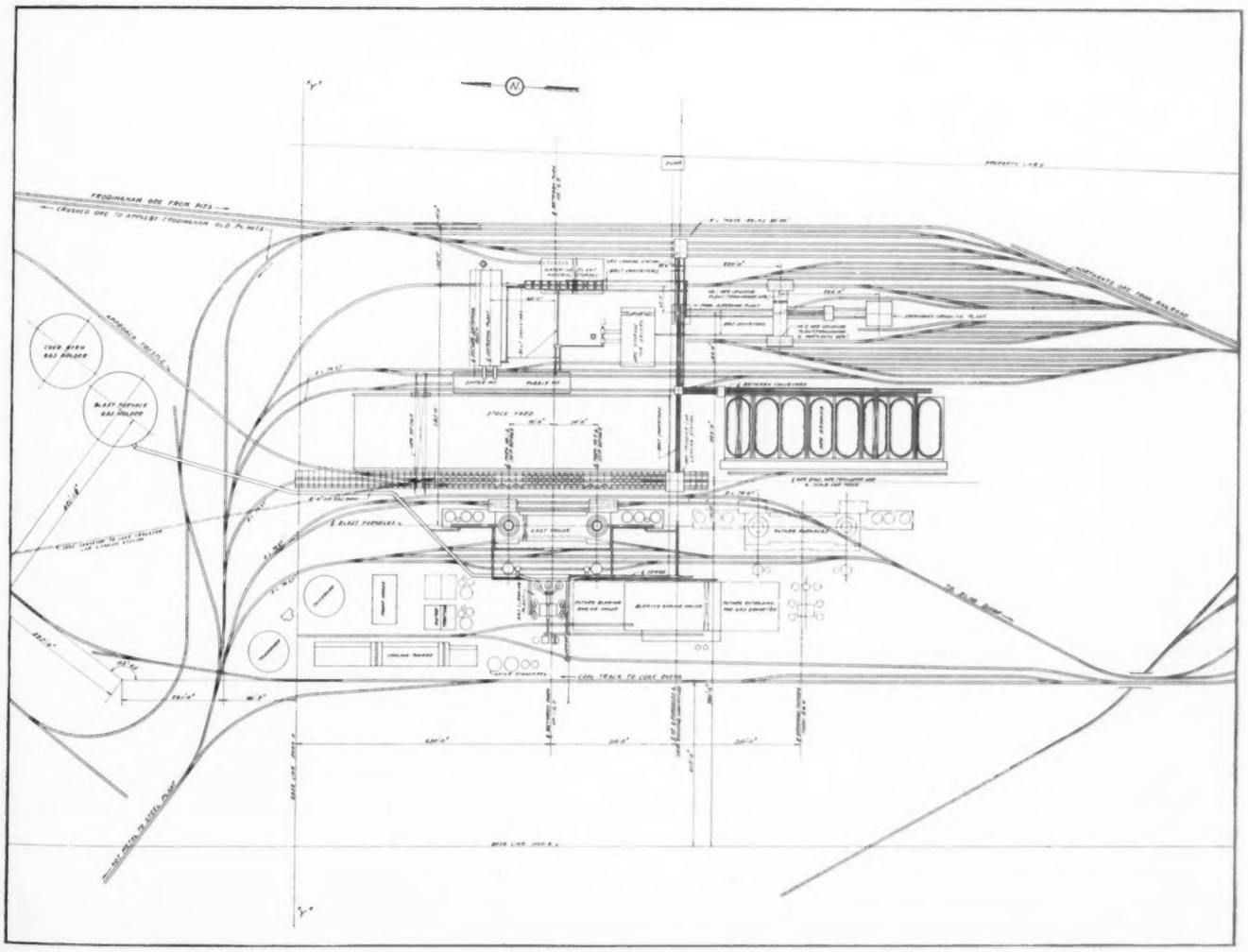
Fig. 2—Sectional elevation of No. 1 furnace and skip pit

Fig. 3—General plan of new blast furnace and iron stone preparation plant

Scunthrope district, however, is the fact that the blast furnaces there are burdened with the lowest grade of iron ore that is used commercially in large quantities in any place in the world. This is the native Frodingham ironstone containing less than 25 per cent of iron in its natural state, in which form, for the most part, it is charged into the stacks. These ores contain, however, on the average a considerable excess of lime, and for fluxing purposes the company has secured some extensive deposits of siliceous ores near Grantham in the southern part of the county. These must be hauled about 50 miles by rail; in addition to the required silicon, they bring to the burden a welcome enrichment since they contain a much higher percentage of iron. The blast furnaces at Corby operate almost entirely on ores from this deposit, which is known as the Northampton bed and shown in Fig. 1.

With the new basic-bessemer steel plant at Corby, a tremendous amount of attention seems to have been drawn to these low-grade ore fields, although actually they have been the backbone of the British steel industry for more than half a century.

Geologically much the same as the famous Minette ores of Alsace Lo-



rain, they have played a scarcely less important role in European history. They stretch diagonally across the country from Durham county on the North East coast to Dorset county on the South West coast, like paper weights on the map of England, and undoubtedly they have had plenty to do with keeping that map from changing.

In 1936, 18,015,400 tons of iron ore was used in Great Britain. Of this quantity, 5,486,900 tons was imported principally to sea port plants whose supplies of native ores have become depleted, or the mining of them too costly. Of the remainder, 11,134,400 tons, or about 90 per cent of all domestic ores and about two-thirds of the total consumption, come from these Jurassic ironstones, the average iron content of which is calculated to be about 27.6 per cent as shown in Table II.

Since an ore containing less than 50 per cent iron, or perhaps 40 per cent if self-fluxing, is considered a

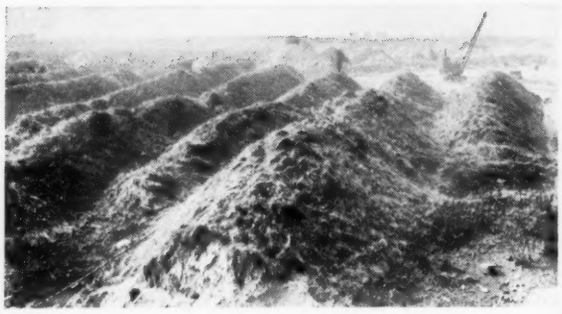


Fig. 4—Typical Typography of plant site backfill from previous mining operations

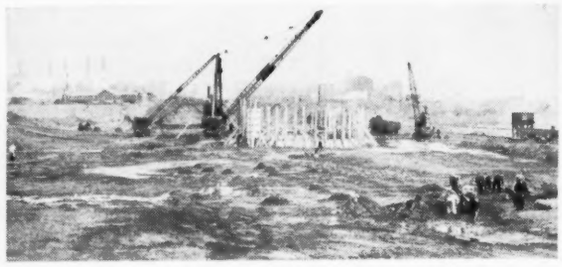


Fig. 5—Beginning of furnace foundations showing how area was stripped to bed rock

Table II

Iron Content of Jurassic Ironstones in England*

Jurassic Ironstones	Production in 1917, tons	Average iron content, per cent
Northampton stone (inferior Oolite)	3,169,110	32.5
Cleveland stone (middle Lias)	4,809,861	28.1
Leicestershire stone (middle Lias)	937,707	25.2
Oxfordshire stone (middle Lias)	434,435	24.0
Frodingham stone (lower Lias)	2,699,532	22.7
Raasay stone (upper Lias)	65,985	23.0
Total	12,116,630	27.6

*Source: "Hatch: Jurassic Ironstones of the United Kingdom."

lean material the world over, it has been surprising to find that the producers are being criticized in the British newspapers for not utilizing their own raw materials to the best advantage. It would appear that the extent to which these low-grade ores have been smelted and successfully converted into steel in the past is not generally known.

This might be attributed to the fact that the basic-bessemer process, although invented and developed in England, never found much favor there, not only because there is a limited amount of ores of proper basic-bessemer phosphorus content, but more especially because it was found that by the basic open-hearth process, which came later, could be produced steel superior in quality to the bessemer grade, for most of the purposes to which British steel was applied.

Consequently, the efforts of British steelmakers seem to have been concentrated on the perfection of an open-hearth process for refining the pig made from these medium high-phosphorus ores, and, over a long period of years, a remarkably efficient and economical open-hearth operation has been developed. It is featured by the use of an active mixer in which the silicon of the pig is reduced to a uniform content of about 0.45 per cent, and by large 250 and 300-ton tilting furnaces, which are capable of producing heats of almost full capacity in about 20 hours, tap to tap. Charges of 100 per cent hot metal can be, and frequently are, worked by the special methods employed. The open-

Table III

Typical Blast Furnace Practice in Scunthrope District

Analysis of Ores

Item	Average local, %	Average Northants, %	Sinter, %	Average burden, %
Iron	21.5	33.8	35.5	27.52
Silica	7.3	10.4	14.5	8.93
Alumina	4.4	6.6	8.2	5.65
Lime	19.8	2.3	18.2	15.21
Magnesia	1.5	1.0	2.7	1.65
Phosphorus	0.34	0.67	0.52	0.47
Manganese	0.89	0.18	1.08	0.88
Sulphur	0.290	0.048	0.284	0.23

Operating Data

Production G. T. day	322
Coke rate lbs./G. T. pig	2,760
Flue dust lbs./G. T. pig	380
Blast vol. C. F. M.	39,140
Blast temp. °F.	1,040
Blast press. lbs./sq. in.	10.5
Top temp. °F.	290
Burden ratio	2.90
Slag vol. lbs./G. T.	2,630

PIG IRON ANALYSIS:

Silicon, %	0.61
Sulphur, %	0.073
Phosphorus, %	1.64
Manganese, %	1.35

SLAG ANALYSIS:

Silica, %	32.20
Alumina, %	17.86
Lime, %	41.78
Magnesia, %	3.89
Manganese oxide, %	1.70
Sulphur, %	1.79
Lime-silica ratio	1.30

TOP GAS ANALYSIS:

Carbon dioxide, %	10.3
Carbon monoxide, %	28.7
Hydrogen, %	3.7
Nitrogen, %	57.3
CO/CO_2 ratio	2.79

Burden

Frodingham ironstone in burden, per cent	52.7
Northants ores in burden, per cent	22.2
Sinter in burden, per cent	21.3
Misc. ores and scrap, per cent	3.8

Coke Analysis

	Per cent
Fixed carbon	87.5
Ash	10.0
Phosphorus	0.007
Sulphur	1.40

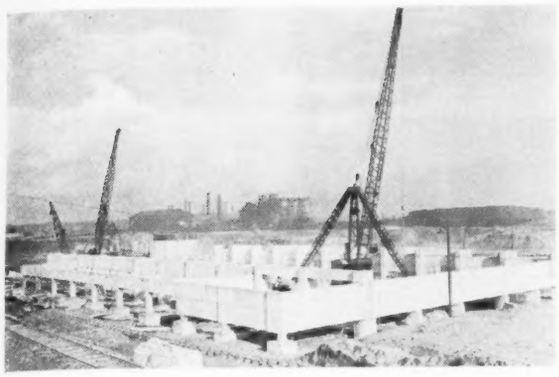


Fig. 6—Foundations for blowing engine house. Yard level would be approximately at top of concrete shown in illustration

hearth slags are sufficiently high in soluble phosphorus content to be used as fertilizer and consequently bring a substantial credit as a by-product.

The men responsible for this development would no doubt include Talbot, the inventor of the tilting furnace. In the Scunthorpe district, however, highest credit is given to the man who guided the pioneering activities in the Frodingham and Appleby works, the late M. Manneburg, and to his associates.

Scunthorpe blast furnace operators have been making from their local ironstones, which are the leanest of the lot, a satisfactory grade of iron for the basic open-hearth furnace for about 50 years. Soda ash is not used.

No "outside" blast furnace or steel mill scrap is ordinarily used, but not withstanding the excessively lean burden and high-slag volume, almost 3000 pounds per ton of pig the fuel consumption is not as high as one might expect. As low as 2400 pounds per ton has been recorded for a month's run under the best conditions.

However, this is much better than the average results obtained, and a figure of 2750 or even 3000 pounds is not considered unsatisfactory. That such a coke rate is not prohibitive is attributed to the cheapness of the Frodingham ironstone, which is won by open-pit methods and transported in mine cars with a short haul to the furnace bins. Actual cost of mining and loading averages about 25 cents per ton. Even with a high royalty added, it seems safe to assume that the unit costs must be not more than 4 cents, delivered at furnace, which is lower even than our Birmingham, Ala., ores, and only about half the price of Lake ores at lower lake ports.

Coke for the Scunthorpe district is made in by-product ovens locally, or at the mines from Durham and Yorkshire county coals, chiefly the latter. The Appleby-Frodingham Co. has extensive collieries and ovens of its own near Sheffield, South Yorkshire, at a distance of about 60 miles, but no ovens at Scunthorpe until now. The coke now being used seems to be about on a par physically with the grades made in our Youngstown, O., district from 85 per cent high and 15 per cent low-volatile coal. Chemical analyses of coke and ore and further particulars of typical present furnace practice at the Appleby-Frodingham works are given in Table III.

The present Appleby-Frodingham works is really a combination of two plants, continguous, but each having a group of four blast furnaces, melting shop and rolling mills. Additions to the Appleby melting shop now partially complete, will give the works an annual capacity of 800,000 tons of steel per annum. The other additions now being made consist of a battery of by-product coke ovens, of which there are none at present, and a blast furnace plant complete with all auxiliary equipment, including ore crushing, screening and sintering facilities on a new, clear site that adjoins the other properties.

There has thus been an unlimited opportunity to prepare designs and select equipment that could be proven to be best adapted for processing most economically and satisfactorily the raw materials at hand, and for achieving the desired quality of products and by-products. It was frequently difficult, however, to choose between alternative courses, as in many cases the development of designs and equipment in the two countries has followed diverging lines. For exam-

(*Please turn to Page* 47)

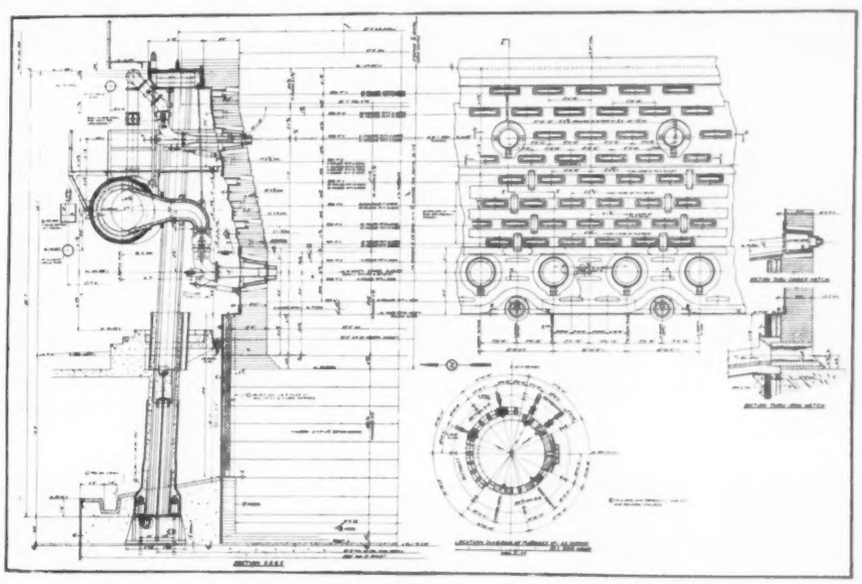


Fig. 8—Section through hearth and bosh. Note provision for installation of bosh tuyeres

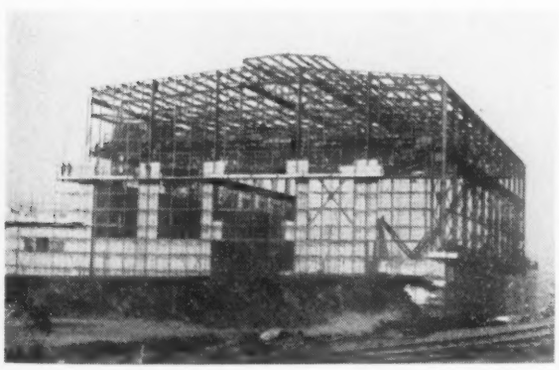
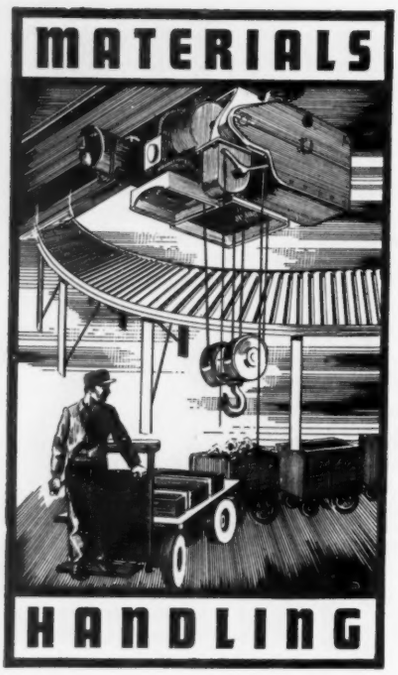


Fig. 7—Blowing engine house in the course of construction



Aircraft Assembly

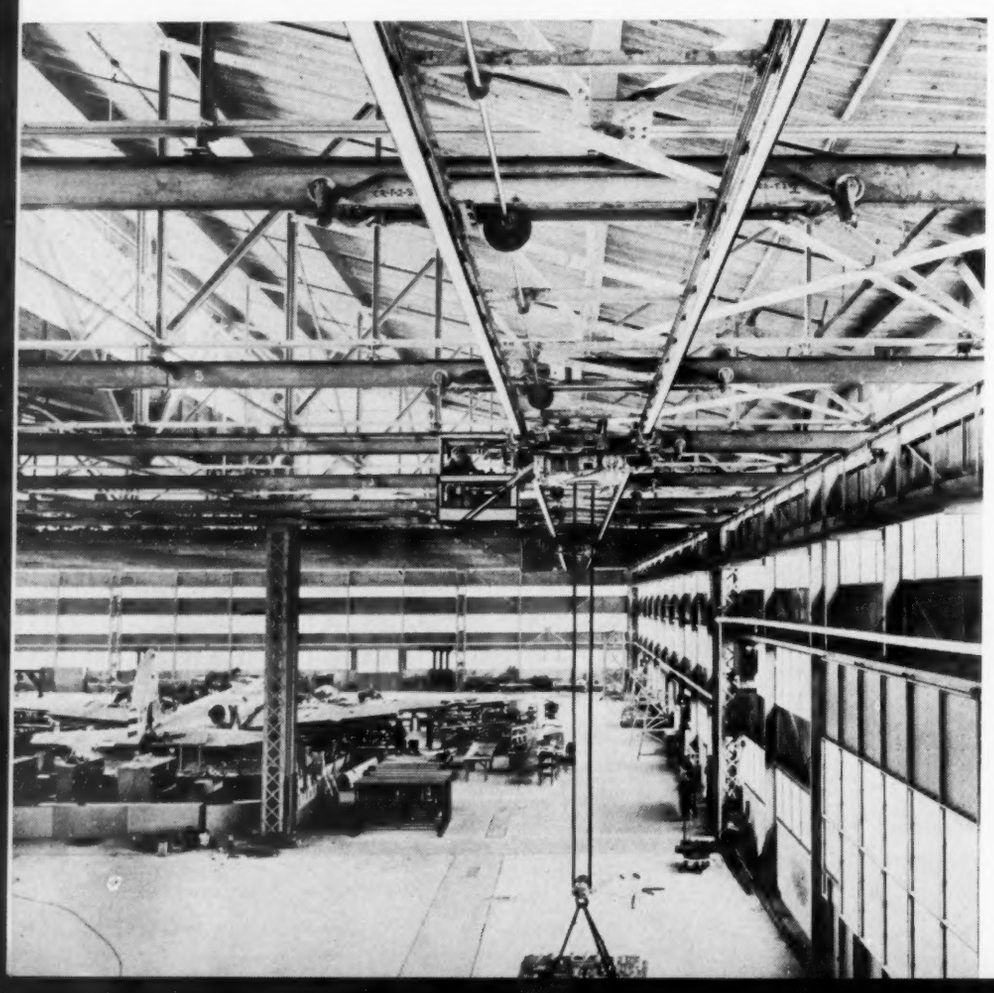
Cab-controlled monorail system with interlocking bridges aids construction of huge transports in recent additions to Seattle plant

■ AS IN THE case of its new hammer shop (STEEL, page 57, June 7, 1937), Boeing Aircraft Co. again demonstrated its reliance on modern materials handling equipment in the most recent addition to its No. 2 plant in Seattle. To its main 200 by 300-foot assembly unit (STEEL, page 71, Feb. 1, 1937), two additional bays, each measuring 125 by 300 feet, have been added for subassembly work. The entire structure now offers nearly 5,000,000 cubic feet of clear working space, and is served by an elaborate overhead handling system.

These new portions of the building are being used for body and wing construction of the 33 passenger, 4-engined transports being built for TWA and Pan American airways, and the new flying fortresses for the United States army air corps. Final assembly operations will be carried on in the original portion of the building. The company's main plant, a short distance away, is being used for primary work on parts of all the 4-engined planes and for complete assembly of the giant 72-passenger Boeing Pan American clippers.

Extensive Memorial System

Handling equipment includes a total of 8500 feet of monorail and what is said to be the longest single clear span crane of the underslung type in existence. Traveling 35 feet above the 200 by 300-foot floor of the main assembly section, it is 162 feet long and will carry a 20-ton load distributed along its length, or five tons at any one point. In the expanded section of the building four 60-foot cranes have been installed, two in each 125-foot bay. The pair of cranes in each bay may be interlocked end to end and operated as one unit from any carrier. A similar feature of interlocking was used in the earlier



Monorail crane system recently installed in Boeing's new Seattle plant. The double track at top is a series of five crane bridges stretching the 450-foot length of the building. Crane at far end is 162 feet long

hammer shop installation. Crane bridges are of the 2-rail type, with multiple trucks.

All the cranes travel along runway rails approximately 20 feet apart extending across the 300-foot width of the building. They are propelled by MonoTractor drives with airwheels furnishing the traction.

Two carriers with control cabs travel along the system carrying 5-ton capacity hoists to any spot in the entire building. Crossover rails enable them to travel between the three bays. Each cab operator has within easy reach drum-type controllers for directing crane bridge movements along the runways, or carrier's movements along the crane bridge, and also has control of the hoist's vertical movements. All are "dead man" controls which return automatically to center and lock in a stopped position when unattended. Push button contactors enable the operator to interlock crane bridges. End-stops and safety devices are installed throughout the system.

All units travel at a speed of 150 feet per minute, enabling the operator to move a load across the 450-foot length of the building in three minutes, or around the entire circumference in 10 minutes. The hoist may be operated at a speed of either 20 feet per minute or five feet per minute. In addition, a "micro lift" device permits hoist speed to be reduced to less than two feet per minute for extreme accuracy in leveling a load over a limited range.

Assembly Crew Rides the Merry-Go-Round

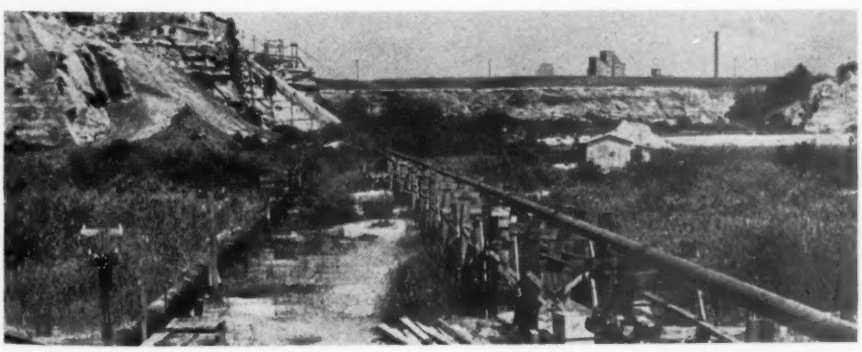
■ **Traveling workbenches mounted on a merry-go-round conveyor system are an innovation in the sheet metal assembly division of the Cadillac plant in Detroit. The system comprises 50 workbenches placed on an oval-shaped conveyor loop and stocked with parts for ten different sheet metal assemblies including hoods, louvres, head and tail lights, and similar subassemblies. After each bench has been stocked with parts, the crew "steps aboard" the slowly moving line and begins work. On completion of their work, assemblers merely walk across the center of the track to workbenches stocked with new parts. The system makes possible a circuit of sheet metal parts (exclusive of bodies) from painting to chassis assembly in complete sets, and eliminates handling and storage involved when quantities of fenders, hoods and radiator shells are put through at the same time**

Conveys Sand In Rubber Lined Pipe

■ Two years ago the Ottawa Silica Co., Ottawa, Ill., installed a test length of 8-inch steel pipe lines by B. F. Goodrich Co., Akron, O., with a ¼-inch thickness of special abrasion-resisting rubber. Ordinary steel pipe conveying sand at this point had an average life of six weeks. The original length of rubber-lined pipe is still in service and shows no sign of serious wear.

As a result of this test, the company has installed 900 feet of 8-inch spiral welded pipe lined with ¼-inch rubber and shown at the right in the illustration. This line runs from the concentration point in the pit to the chinese conveyor at the foot of the plant and handles from 40 to 65 per cent solids, depending on the run of silica sand. Standard steel pipe previously used for this line averaged nine months' service. The 900-foot rubber-lined pipe has now been in use over six months and shows no perceptible wear.

Right hand line is 8-inch spiral welded steel pipe lined with ¼-inch layer of rubber for protection against sand carried by this line



Caster Table Built For Feeding Shear

■ An interesting table, built up by welding, is shown in an accompanying illustration. The sheet of steel being sheared into sections is supported at the rear end by a chain sling. A jib crane fitted with an electric hoist holds up the excess weight at the rear end by means of the chain sling, until the sheet has been reduced in length to a point where it is fully supported by the caster table alone.

The work-table is built up on heavy trussed legs, and the top of it is a heavy box-type affair welded together of sheet steel. The top of the hollow box has round holes torch-cut from it, the holes being evenly spaced in rows. One row of holes is fully revealed along the near side, which is not covered with the particular sheet being handled.

Directly below each hole is welded a mounting to receive a swiveling

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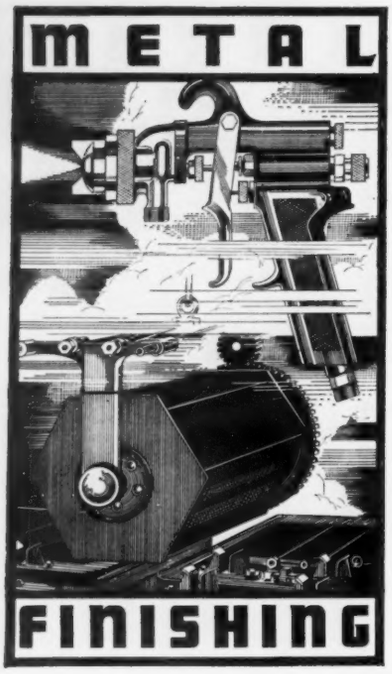


Paint Specifications

Uniformity and corrosion protection for metal finishes are assured by adequate specifications and tests, practical examples and details of which are presented here

By ROBERT J. MOORE
Development Manager,
Varnish Resin Division
Bakelite Corp., Bloomfield, N. J.

■ FOLLOWING closely upon improvements made possible by research, engineers in many metal fields have insured procurement of modern coatings through well designed and rigid specifications for primers and finishing coats. Among specifications serving as models for general engineering use are the following primer and aluminum vehicle specifications:

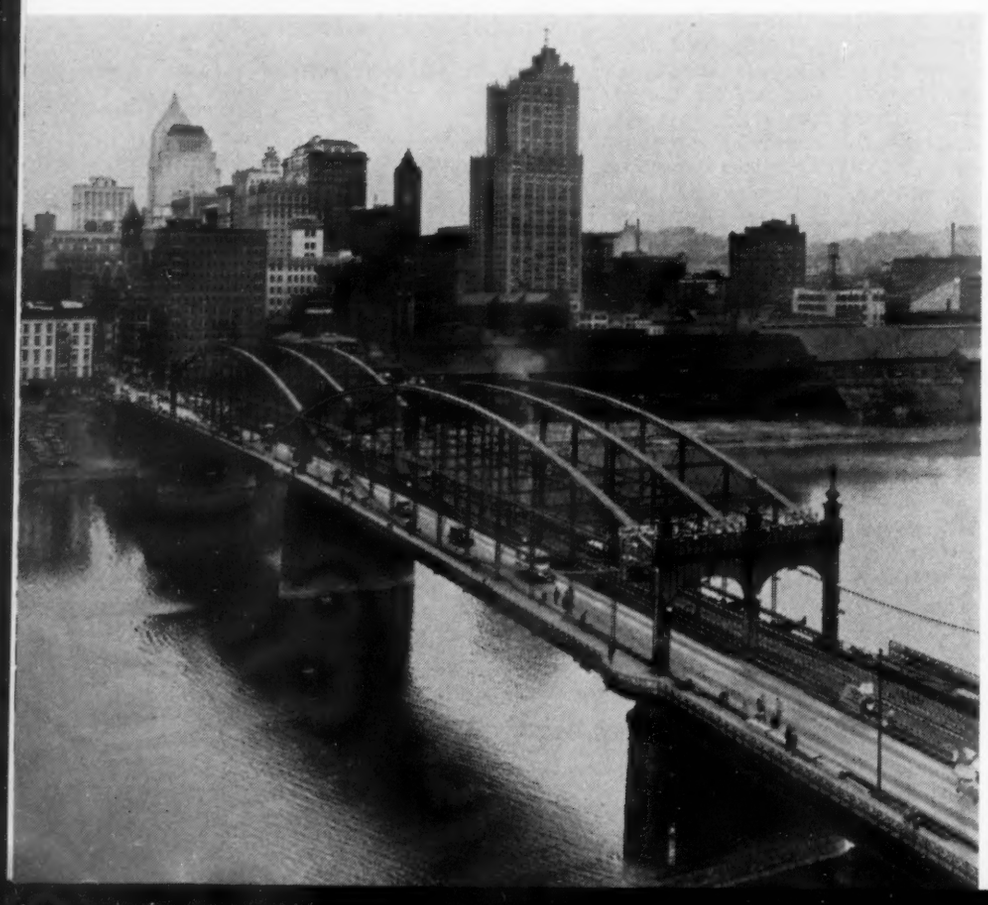
United States Naval Aircraft Factory primer P-23a, aluminum vehicle V-10, deck and pontoon enamel M-67; United States Engineers (Mississippi locks and dams) red lead varnish primer 10-03-(2), zinc chromate varnish paint 10-03-(3), aluminum paint 10-04; Port of New York Authority (bridge paints) primer, aluminum vehicle; State of Maine highway commission aluminum vehicle; State of Connecticut highway department iron oxide primer No. 41-C; State of Minnesota highway division (bridge paints) aluminum vehicle 219.08 (e); Commonwealth of Pennsylvania spar varnish V-4; Aluminum Co. of America specification No. 13 for aluminum vehicle; City of Milwaukee (bridge paints) inhibitive primer Specification T-1-33, aluminum paint Specification V-1-33; and many others.

Anti-corrosive primers include the fundamental factors required for paint film integrity, water resistance, flexibility and its retention, inertness to chemical change and the presence of a rust inhibitor. Whether the film is to resist iron rust or nonferrous alloy corrosion, the prime requirement is to protect the surface from moisture as weathering corrosion does not start until moisture reaches the surface.

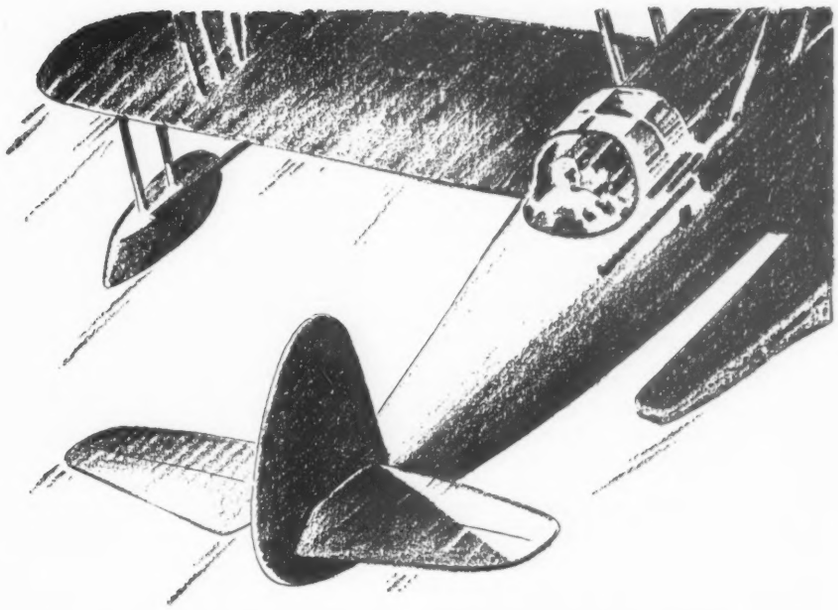
Moisture Tests Included

Since resistance to moisture is so important a factor in protection, laboratory tests to evaluate and specifications for procurement should be rigorous. For naval aircraft spar varnishes and for vehicles for primers, aluminum paint and enamel the following test is frequently specified (For details of method see A.S.T.M. Standards, Part II, page 702, 1933; or Navy Department Specifications ST-15-A-C6A):

Water resistance test: Flow-out films on tin, dried 48 hours, shall withstand immersion in distilled water for 96 hours at 68 to 70 de-



Zinc chromate primer and aluminum finishing coats using bakelite resin base protect the aluminum alloy beams, stringers and deck of the reconstructed Smithfield street bridge, Pittsburgh, Pa.



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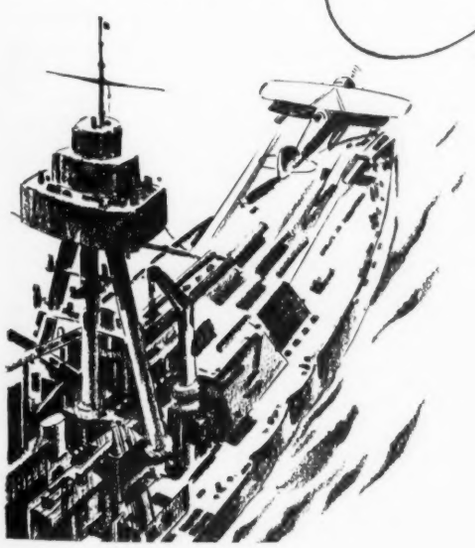

Particularly effective in electrolytic cleaning due to its high conductivity.

Assures quicker action than other alkalis.

Prevents grease and dirt from re-depositing.

Easy to pour, quick to dissolve.

Dry—highly concentrated—economical.

Quickly removes the grease, soot, dust, and various other kinds of dirt unaffected by pickling acid.

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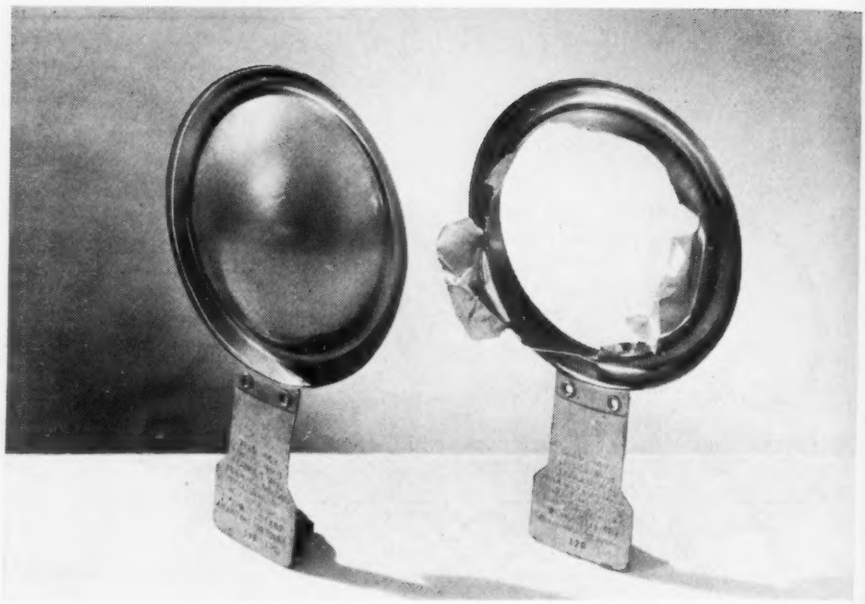
grees Fahr. without whitening, dulling, checking or other serious defects. Varnish is flowed on well cleaned tin and allowed to drain and dry in a nearly vertical position under normal drying conditions. The uppermost end during drying is immersed about 2 inches below surface of the distilled water. This 96-hour immersion contrasts with the 1-hour immersion test for spars generally used before the 100 per cent phenolic resins were employed.

Boiled Seven Hours

Boiling water resistance: A flow-out film on tin, dried 48 hours, shall withstand boiling in water 7 hours without whitening, dulling, checking or other serious defects. The panel is prepared as above. The 7-hour period is selected as a moderate test without requiring attendance overnight, although a 33-gallon or shorter varnish will generally withstand boiling water for two or three days. Some laboratories prefer a 7-hour test at 75 degrees Cent. to maintain water level.

Quantitative moisture permeability: A quantitative method for measuring moisture passing through a film may be preferable to immersion methods which in reality indicate decomposition of the film in water. Such methods have been used and published by the Forest Products Laboratory (I.E.C. 25, 835, 1933), the Aluminum Co. of America (I.E.C. 25, 842, 1933) and by the New Jersey Zinc Co. Of special interest is the method recently devised by H. F. Payne, New York Paint and Varnish Production club (Official Digest, Oct. 1936). In this method the film is applied on a special grade of paper. Initial resistance value of the fresh film and change on aging by accelerated breakdown conditions are determined. Accelerated conditions may involve ultraviolet light or a combination light and oxidation test with oxygen or ozone.



These diaphragms are used on tankers to relieve excessive pressure by bursting thus preventing possibilities of explosion. Protection against corrosion is important otherwise bursting pressure would be effected. Made by Black-Sivalls & Bryson Mfg. Co., these are calibrated to burst at a pressure of 120 pounds per square inch

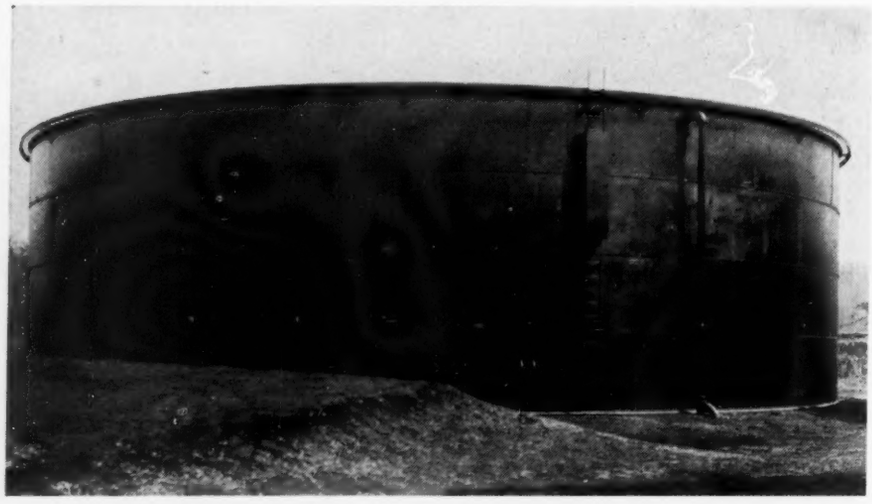
The second essential factor in film integrity is flexibility or distensibility and its retention during natural or accelerated aging. This is readily determined. For clear finishes, such as varnishes or vehicles for primers and paints, many specifications require a high kauri reduction value. For example, Naval Aircraft spar varnish (V-10), Aluminum Co. of America specification 13 for highest grade exterior paint, United States Engineers' specification for primer vehicle, all require the varnish to pass 140 per cent kauri reduction. The details of this test are published in most federal or navy spar varnish specifications, also in A.S.T.M. D-154-28, (Standards, Part II, p. 699, 1933).

Another flexibility test applicable to both clear and pigmented finishes is bending over a mandril as described by Dr. A. E. Schuh of the Bell Telephone Laboratories Inc. In such bending tests, while initial flexibility is of importance, we are more concerned with the retention of this property on aging. Films applied to standard metal strips are exposed to aging conditions such as prolonged baking or exposure to ultra-violet light, oxygen, or ozone at room or elevated temperatures, and then are bent over mandrils at intervals to determine loss in flexibility.

Resistance Indicates Retention

Degree of resistance to chemical change is regarded as a measure of a film's ability to retain its original properties during exposure or use. To indicate stability, immersion in 5 per cent sodium hydroxide solution for 24 hours is required by various navy, federal, state and municipal agencies in procuring varnishes and vehicles for anti-corrosive primers and exterior finishing paints. Where unusual alkaline conditions are to be met, as in soils, the vehicle for finishing coats may be made to resist 100 hours or more in the caustic solution. Films containing relatively high peroxide linkages, present either in the original vehicle or formed during oxidation, are readily broken down by alkalies. The syn-

Around the 264-foot circumference of this million-gallon water tank, 196 coded panels were painted to the full height of 24 feet to test 196 paints and varnish. Tests were conducted by Pittsburgh-Des Moines Steel Corp. for the borough of Ambridge, Pa. to find the most durable finish for water tank interiors



thetic resin films, on the contrary, which dry with more polymerization and less oxidation are admittedly more durable and in laboratory tests show greater alkali resistance.

Sodium hydroxide test specifications follow: Dip rounded end of a well cleaned 6 x 1-inch test tube into the varnish and let dry in an inverted position for 48 hours with temperature not below 68 degrees Fahr. Place the end which was uppermost during the drying 2 inches below the surface of a 5 per cent solution of sodium hydroxide for 24 hours at 68 degrees Fahr. (20 degrees Cent.) plus or minus 2 degrees Fahr. Remove from reagent and immerse a number of times in clean water to remove excess solution. Visual examination of the film shall show no whitening, dulling, checking, blistering or removal. Defects at the extreme bottom of the tube may be disregarded. Reagent shall be prepared from C. P. sodium hydroxide in distilled water. Test tubes should be new ones, cleaned with alcohol and dried.

Resistance Overlooked

Importance of alkali resistance, especially in primers for metal, is frequently overlooked. In such paints, when moisture does get through the film (and no organic film is 100 per cent waterproof), an alkaline reaction occurs. If the vehicle, like linseed oil, is softened and slightly hydrolyzed by alkalies, softening and blistering may occur. Since this reaction is at the metal-primer interface, it causes frequent paint failures described as rusting or corrosion beneath the outside paint, eventually leading to bad blistering and peeling.

Film inertness also is measured frequently in terms of resistance to various acids and other agents. For example, specifications for some spar varnishes and primer vehicles require coating the vehicle on test tubes and immersing in dilute solutions of sulfuric or acetic acid.

As retention of resistance properties on more complete oxidation or aging is important, tests may be conducted on test tubes after intervals of exposure to weathering, ultra-violet, oxygen or baking.

The effect of chromate ion in inhibiting corrosion is becoming more widely studied and is being used in ever increasing fields. Modern tests on anti-corrosive primers favor zinc chromate as all or part of the pigment. It may be used in conjunction with iron oxides, red lead or other standard pigments. Its presence is required in many of the modern anti-corrosive primers for steel, dural and magnesium alloys such as the following:

Naval aircraft primer specification P-23, P-24, P-27; United States Engineers' "zinc chromate primer," "red lead-zinc chromate paint"; Aluminum Co. of America specifications; Dow Chemical Co. suggestions for painting dowmetal, also in numerous state and municipal primers for bridges and other structural steel.

Requirements Summarized

In summarizing the main requirements in specifications for anti-corrosive primers, aside from flexibility of the vehicle, it is well to specify: High moisture resistance (7 hours boiling water), alkali resistance 24 hours in 5 per cent sodium hydroxide) and the presence of inhibitor (zinc chromate) in the pigment combination.

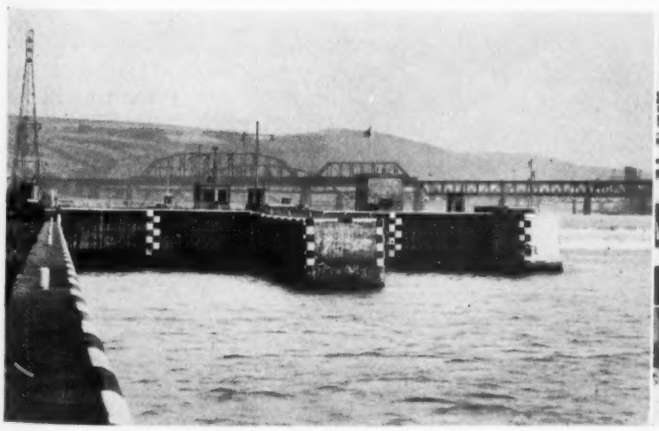
Finishing paints for the protection of metal to be exposed under corrosive conditions, as in underground tanks and pipe lines, involve several types of painting schedules. These include baked-on coatings, wrapped coatings, melted coatings and the air-dried paint systems. For high integrity in the latter paint system two coats of anti-corrosive primer followed by two coats of chemically resistant finishing enamel are recommended.

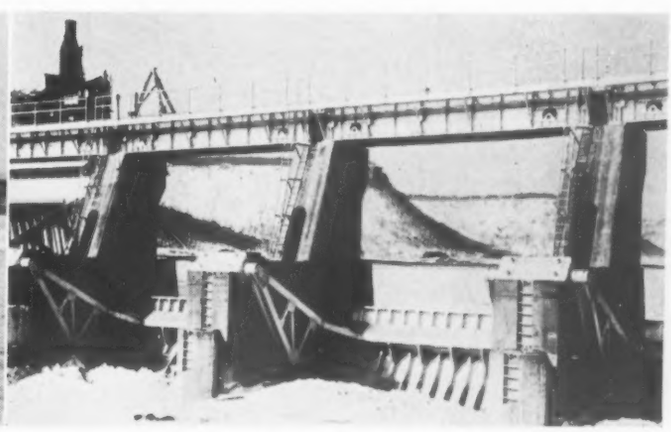
Durability factors listed as requirements for the primer vehicle also apply to the finishing coat vehicle. For pipe lines and underground tanks as well as under water or oil submersion generally better results are obtained by reducing the oil content of the vehicle and using as much as an equal weight of a 100 per cent phenol-formaldehyde resin. High-resistance properties are obtained so that rigid specification tests may be applied. These include the following: Drying time—dust-free 1 hour, hard 3 hours; water resistance at room temperature 7 days, boiling 24 hours; alkali resistance 5 per cent sodium hydroxide at 70 degrees Fahr. for 96 hours; acid resistance 15 per cent sulfuric acid at 70 degrees Fahr. for 96 hours; gasoline 6 hours; alcohol 50 per cent for 6 hours.

Aluminum bronze has given excellent results in the resistant vehicle. Such aluminum enamels over an anti-corrosive primer have given unusual service on the interior of oil tanks and tankers, on exterior steel tanks and especially in protection of steel and alloys subject to continual immersion in water. Where desired, other pigments may be substituted for the aluminum as in the various machinery grays or laboratory and plant black acid-resisting paints.

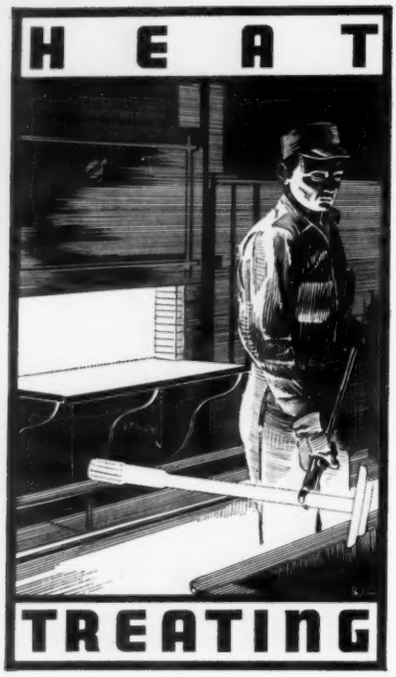
Valves in Review

■ "Flow", a sound film recently released by Crane Co., 836 South Michigan avenue, Chicago, shows how valves and fittings give mankind control over liquids and gases. The film contrasts the earlier means of controlling flow with those of present day methods.





Lock gates on the Monongahela River near Braddock, Pa., are shown at left. Given an anti-corrosive finish with 100 per cent bakelite resin, these gates for three years withstood the corrosive and abrasive action of water containing sulphuric acid and much sand. Tainter gates of a dam near Twin Cities, Minn., shown at right, have successfully withstood packed ice and winter weather without exposing steel surface to corrosion



Flame Hardening

Oxyacetylene flame in surface hardening is flexible, involves little equipment and produces excellent results. Possibilities and application data are given here

By JOHN T. HOWAT*
Superintendent, Heat Treating Department, American Spiral Spring & Mfg. Co., Pittsburgh

■ IN 1925 WE had to develop a new heat treating process, as conventional methods were not satisfactory for certain parts due to their size, distortion, unsatisfactory wear or low impact resistance.

Search revealed a flame hardening process used in England by Metropolitan Vickers Co. and Patent Gear Hardening Co. Although it first appeared impractical, after many weeks of development we found it very successful. The process depends upon the skillful application of the oxyacetylene flame to the surface to be hardened, followed by proper degree of quenching with water or air.

Although it appears simple, a temperature of 6300 degrees Fahr. is being applied in this process at a distance of only ⅛ to ¼-inch from the surface of the steel in which a temperature of only 1450 to 1550 degrees Fahr. is desired. This means application of the heat, for only a second or two, either too close or too long, may burn the metal at the surface and produce brittle, coarse grain underneath or may overharden and cause surface cracks. Uneven rate of application of heat or quench will result in hard or soft spots.

Today, 12 years later, even though mechanical means for operating torch and quenching equipment have been developed, success of the operation is still dependent upon the judgment of the operator as to the amount of heat, temperature to apply and extent of quenching.

After many months of experimental and service work, we have made some observations. The process is flexible. It has a wide range of adaptability as size or shape of a part now offers no restrictions, provided the surface area to be hardened is not too large a single area of this section. The high surface hardness of a case or carburizing treatment with the toughness of a fully quenched carbon steel is imparted to the metal. Distortion and residual heat treating stresses are all reduced to the minimum. The chemical analysis undergoes no sudden change and the microstructure shows no sharp line of demarcation between the hardened zone and the core as found in case-hardened work. A hardened zone is produced at least two or three times the depth obtainable by carburizing, and this zone will not spall with impact, vibration or deformation.

Cheap carbon steels surface hardened by this process have been used successfully to replace expensive alloy steels formerly required on many applications to provide the necessary wear resistance. High carbon steels from 0.35 to 0.90 per cent carbon can be hardened to 400 to 700 brinell, respectively, but as the carbon or alloy content

From a paper presented by the author at the thirty-eighth annual convention, International Acetylene association, Birmingham, Ala., November, 1937.

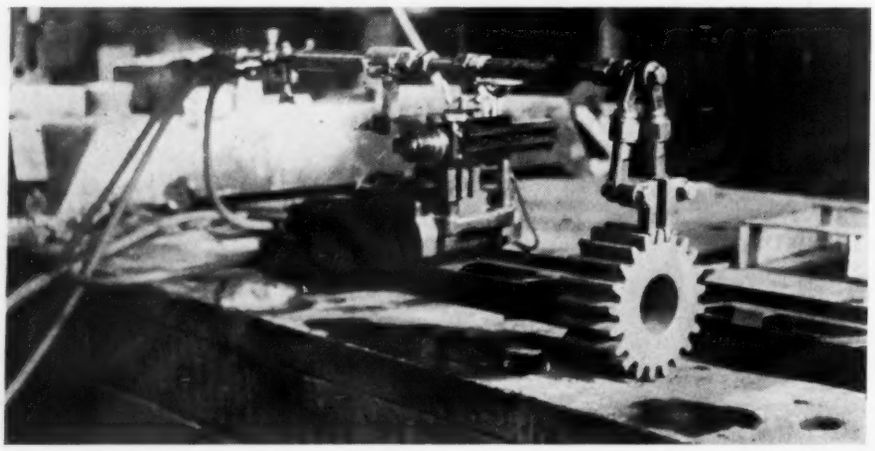


Fig. 1—Typical setup for flame hardening. This motor-driven, water-cooled torch is hardening a steel pinion 10 inches in diameter with a 6-inch face. Photo courtesy Air Reduction Sales Co.

is raised greater care must be taken in heating and quenching. Alloy steels that can be liquid quenched or air hardened can be successfully flame hardened.

As the area being heated is only a small portion of the total mass, quenching action is much faster than if the entire mass were heated and completely quenched. It is therefore possible to obtain, and successfully use in service, brinell hardness values at least 30 to 50 points higher than those obtained by the full quenching method. This is due to the balancing or tempering action of the metal adjacent to the hardened zone which results in a fine tapering of the martensite with a gradual change to troostite and sorbite and finally to pearlite in the core. The increased toughness resulting from this physical condition combined with the higher brinell hardness accounts for the successful wear resistance obtained in the flame hardening method.

Practically No Failures

As there is no hardening from 1/16 to ⅜-inch below the surface treated the balance of the metal will be in the soft annealed condition with minimum casting or forging strains. This accounts for there being practically no failures in service of flame hardened work, whereas fully 80 per cent of failures of quenched work are breakages caused by residual quenching strains. Where possible, a low drawing treatment at 400 degrees Fahr. may be used but is not necessary.

A careful flame hardening of heat resisting semisteels and cast irons results in a decided raising of the brinell hardness. Selection of improper analysis steel may mean low hardness or cracking from excess hardness. Where alloy or high carbon steels are used, rate of heating must be carefully watched and the degree of quenching reduced considerably.

Although distortion is expected to be negligible or within machining tolerances, the part should be fully annealed to remove casting or forging strains where minimum distortion is desired. Should welding have been done, a re-anneal should be given if possible. Careful application of heat to sharp corners, etc. eliminates most of the trouble experienced with surface cracking.

Many areas because of their size may require several passages of the torch across the surface, or the part may be rotated through the flame several times. The heat treated areas are bound to overlap on a very narrow width resulting in a drop in hardness of approximately 10 to 15 points brinell on these areas.

Where flame hardening is applied to unmachined surfaces, they should be chipped or sand blasted to remove as much scale as possible as scale will fuse on the surface under the oxyacetylene flame. Due to the decarburized surface of unmachined castings, hardness after flame hardening is usually about 30 to 40 points lower than on machined surfaces of the same carbon content.

For this reason it is recommended that the carbon be raised a few points when unmachined surfaces are to be flame hardened. A cast steel of 0.35 to 0.45 per cent carbon and a forge steel of 0.45 to 0.55 per cent carbon will give very satisfactory hardness and service results.

It is impractical to give a figure for gas consumption per square inch of area hardened as this depends on style of tips used, surface area being hardened and mass of metal under that surface. Gas consumption ranges from 2 to 8 square inches of hardened area per cubic foot of gas used, and rate of travel may run from 2 to 14 inches per minute.

Fig. 1 shows a typical set up for flame hardening. Here a machine operated, water cooled, multiple tip torch is used to flame harden a 0.40 per cent carbon steel pinion having 10-inch diameter, 2 diametral pitch and a 6-inch face.

The group of flame hardened gears ranging in diameter from 3 to 50.4 inches and from 1¼ to 15 diametral pitch shown in Fig. 3 illustrates the variety of sizes and designs of gears that are handled daily in a commercial flame hardening plant. The three armed or spoked gears are typical mill, crane or industrial gears. In many cases these gears will show internal shrinkage in the finished machined condition where the arms join the hub or rim. If the defect is not too large, we proceed to flame harden the gear, producing one satisfactory for use, whereas if such a gear were fully quenched from a furnace failure through breakage at the defective areas would likely occur. The bores in the ring gears have finished stock which can be removed easily by machining and does not require an expensive grinding operation. In the other gears shown, the bores are usually finished when received for heat treating.

The small ring gears with 36 teeth, 4 diametral pitch and 4-inch face required 20 minutes to harden. Similar gears with 60 teeth required

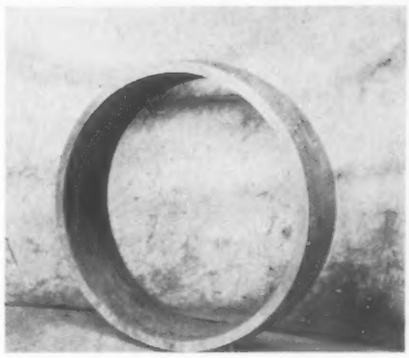
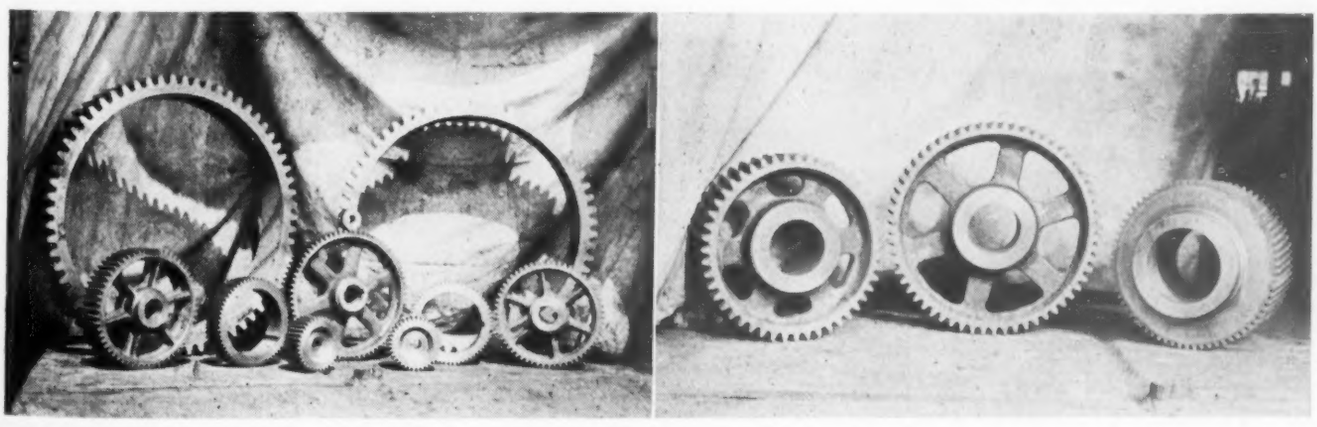


Fig. 2—Inside surface of this grinding wheel mold, an area of 666 square inches, was flame hardened in 2½ hours

Fig. 3 (left)—Shows range of gear sizes successfully flame hardened. Helical gears in Fig. 4 (right) present difficulties in hardening by ordinary methods but are simple with flame hardening process



about 35 minutes to flame harden.

Flame hardening is not expected to take care of all types of surface hardening as there are many applications where for various reasons it is not practical and some other method of hardening is more desirable. However, it has been successfully applied on twist, barrel and plain mill guides; coupling boxes, spindle and pod-ends; bucket lips and tooth points; thrust rings; cams and cam ways; track wheels and rail ends; paper pulverizers; roll neck bearings; roll tightening screws; tube grips; clutches, splines and key ways; abrasive wheel and other molds in addition to other miscellaneous applications.

Many Tips Required

In working these parts only those surfaces required to resist wear or impact were hardened. Heat treating the many varied surfaces listed has required a large selection of tips and equipment ranging from a single tip to multiple-flame tips of several types.

Fig. 4 shows two large sided gears of slightly different design. Both the armed gears present quite a problem for liquid quenching as shrinkage of the rim and large hub could easily cause cracking through the arms unless a careful tin quench were used. Since the two outside gears are the helical type, they cannot be quenched from the furnace as the helix angle probably would be destroyed by distortion so flame-hardening is the most practical method here. The right hand forged steel mill pinion with 69 helical teeth, 2¾ diametral pitch and 10-inch face required two hours to harden. The center cast steel industrial gear with 58 teeth, 3 diametral pitch, 5-inch face and 0.35-0.45 per cent carbon took 1½ hours.

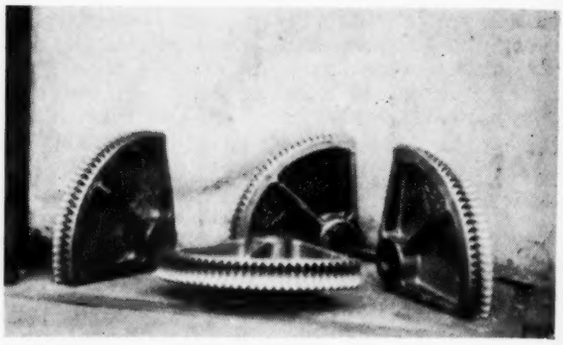


Fig. 7—Cast steel worm gear segments for coke ovens were flame hardened successfully

In Fig. 6, a forged steel shaft with integral pinion for a mill gear unit has 16 teeth, 2 diametral pitch, 12-inch face, 7½ helix angle and 0.42 per cent carbon. It was flame hardened in 45 minutes. Shafts such as this one may be received in the finished machined condition for heat treating. We have experienced no trouble with distortion of the helix angle, the face or the shaft after hardening and we know the slightest distortion of the teeth of a single or double helical gear is most critical in service. Cross or misaligned bearing of the teeth caused by distortion would result in their rapid failure.

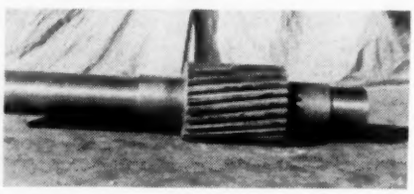


Fig. 6—This integral pinion forged steel shaft was hardened in 45 minutes without any distortion

Fig. 7 shows worm gear segments for coke ovens. These are cast steel with 31 teeth, 3 diametral pitch and 3-inch face and are used under very abrasive conditions. Flame hardening has successfully replaced carburizing on these parts.

The cast steel, herringbone, tube mill pinions shown in Fig. 5 have flame hardened teeth and wabblers. Each pinion weighs 2500 pounds, has 14 teeth, 24-inch face and required 3½ hours for hardening. Made from 0.35 per cent carbon steel, they tested 450 brinell after hardening.

Fig. 5—Cast steel, herringbone, tube mill pinions with teeth and wabblers flame hardened to 450 brinell. Each pinion weighs 2500 pounds

Inside Surface Hardened

Fig. 2 shows a grinding wheel mold whose inside surface was flame hardened. The mold is 26 inches in outside diameter, has 8-inch face and required 2½ hours to flame harden a total surface of 666 square inches. The operation consumed 200 cubic feet of oxygen and 240 cubic feet of acetylene.

Fig. 9 shows a large machine casting 4½ feet in diameter, 2 inches thick and with a 12-inch hub. The hub circumference was flame hardened. The forged steel integral mill pinion and shaft in Fig. 10 has 22 teeth, 2 diametral pitch, 34½-inch face and 0.35 per cent carbon as well as 1.50 per cent manganese. Flame hardening required 5 hours for an area of 2183 square inches which is a rate of 7 square inches per minute. Gas consumed amounted to 200 cubic feet of oxygen and 220 cubic feet of acetylene, about 9 square inches of surface per cubic foot of gas. This pinion shaft was completely finished before heat treating. The face was carefully checked for distortion after heat treating but none could be found. Hardness of teeth tested 450 to 550 brinell.

Two large table bevels shown in Fig. 11 are used in a glass works on plate glass polishing tables. Each bevel has 58 teeth, 1¼ diametral pitch, 7-inch face and 4-foot diameter. Time required to harden each gear was 2¼ hours. Gas used was 340 cubic feet oxygen and 350 cubic feet acetylene.

Fig. 8 shows two blooming mill table mitres of cast steel with 0.45 to 0.50 per cent carbon, 1.10 manganese, 1.00 chromium, 0.35 molybdenum. These are oil treated and

Fig. 8 —These 4-foot diameter bevels are for plate glass polishing tables

drawn to 250 brinell with an impact value of 60 to 65 foot pounds. Tooth surfaces are flame hardened to 650 to 750 brinell. We have approximately 30 of these main bevel gears on large blooming mills that have been flame hardened and in service for over three years. We also have just finished hardening 204 similar bevels made from 0.40 to 0.50 per cent carbon steel for a new mill table.

In Fig. 12, rolls for a standard table roller are shown. An area 5 inches wide on each rollneck was flame hardened to 350 to 450 brinell. This eliminated necessity for using an inner face for the antifriction bearings and permitted them to ride directly on the rollnecks.

These examples illustrate the variety of equipment that comes to a flame hardening shop and tend to indicate some of the possibilities of the practical application of this process.

Fig. 11 (below)—Teeth on these blooming mill table mitres are flame hardened to 650-750 brinell with no difficulty. Fig. 12 (right)—Necks of these rolls were flame hardened to permit direct application of roller bearings eliminating necessity of using an inner bearing face

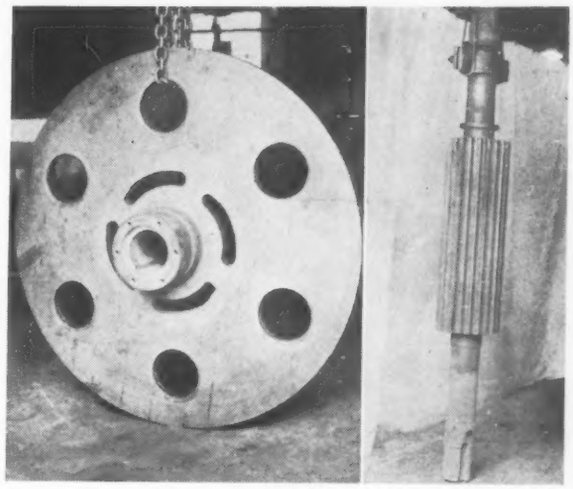


Fig. 9 (right)—Shows large machine casting, 4½ feet in diameter, on which the circumference of the 12-inch hub was flame hardened. Fig. 10 (extreme right—Shows an integral mill pinion shaft completely finished before hardening. Subsequent checking showed no distortion

Anatomical Shirt Shows Action of Body Organs

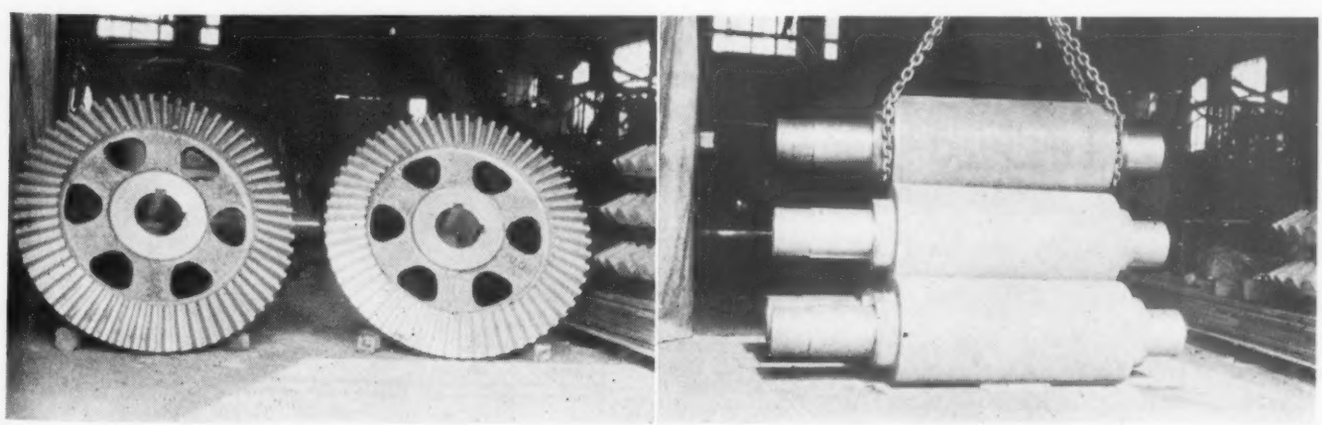
■ For practical and graphic instruction in the location of arteries, bones and organs of the body and arms, Mine Safety Appliances Co., Braddock, Thomas & Meade streets, Pittsburgh, recently placed on the market an anatomical shirt, which when slipped on, presents a true to life picture of the physical features referred to in instruction and working knowledge of first aid. Parts of the body are boldly printed on the shirt in black outline and vivid colors. Movement of the wearer gives the observer an idea of the internal body movements.

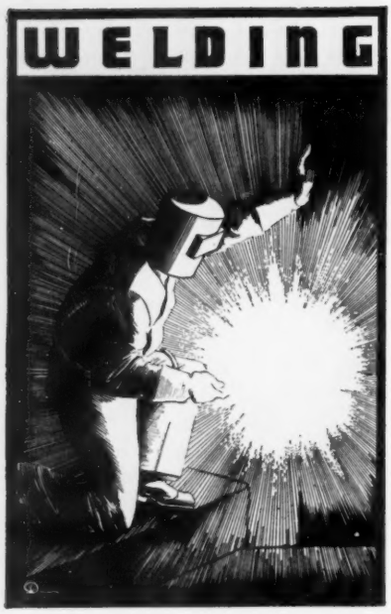
Text on Magnetism, Electricity for Schools

■ *Electricity and Magnetism*, by S. Leroy Brown; cloth, 310 pages; published by Henry Holt & Co., New York; supplied by STEEL, Cleveland, for $2.80; in Europe by Penton Publishing Co. Ltd., Caxton House, Westminster, London.

Although the subject of electricity and magnetism has many subdivisions and includes a varity of manifestations of a comparatively few fundamental phenomena, this new text by S. Leroy Brown, professor of physics at the University of Texas, includes only the more basic principles that have been developed from the study of these phenomena. Since it has been designed to assist the work of elementary classes, it has been made as concise as possible.

Definitions are indicated by italics, and each chapter is supplemented by problems and experiments intended to illustrate and emphasize the principles as well as to furnish a drill for the student in their applications. The many electrical appliances in use today, ranging from electrical toys and electrical doorbells to electric locomotives and complicated communication systems, furnish an excellent background for a beginning of the study of electricity and magnetism.. The general information of the general student is utilized to gain his interest in the more general and comprehensive consideration of electrical and magnetic phenomena.





By ROBERT E. KINKEAD

On this page the author, well-known consulting engineer in welding is given wide latitude in presenting his views. They do not necessarily coincide with those of the editors of STEEL

Recession Is Doomed As Fearless Men Emerge

■ Welding together of the lengths of pipe in the casing of deep oil wells has opened up untapped and immeasurable new petroleum resources. Threaded joints are not strong enough to stand the service in mile deep wells. Again, welding changes the whole economic aspect of a basic industry. Only a few years ago welding of boiler drums in place of riveting permitted higher steam temperatures and higher pressures with economies resulting in lower cost of power. Currently, welding is being applied to the production processes by which steel is made in the mills. Not only are costs of standard products being reduced but new products have been created as a result of this effort. The field has such vast possibilities that the mind of no single man is comprehensive enough to predict the limits of what may be accomplished.

These definite accomplishments have an immediate bearing on the mass psychology existent in the country at the moment this is written. The dumb sheep are discouraged and downhearted who see industry as a field where money can be made out of money, and as an activity where business can create big business men. These people seek the easy way which involves no risk, no dangers, and not too much effort. When such beliefs predominate, industry languishes, men have no work, human character degenerates into the savagery of scrambling for ownership of debts. By the creation of such conditions Nature in her infinite wisdom sloughs off leadership which has grown soft and timid. Out of every depression, recession and panic has come the leadership for the next forward surge.

That this recession has about run its course is shown by the emergence here and there in industry of men who are not afraid. For forty years the steel industry has set the example of spending during a depression. Steel seems to breed two fisted leaders with courage. In other industries strong men are coming to the top.

The destiny of industrial America lies in the direction of doing a better job for less cost. The opportunities are greater than they have ever been. The eagles of Washington have turned out to be canaries. It is time for resolute men of industry to build a better prosperity based on invention and development.

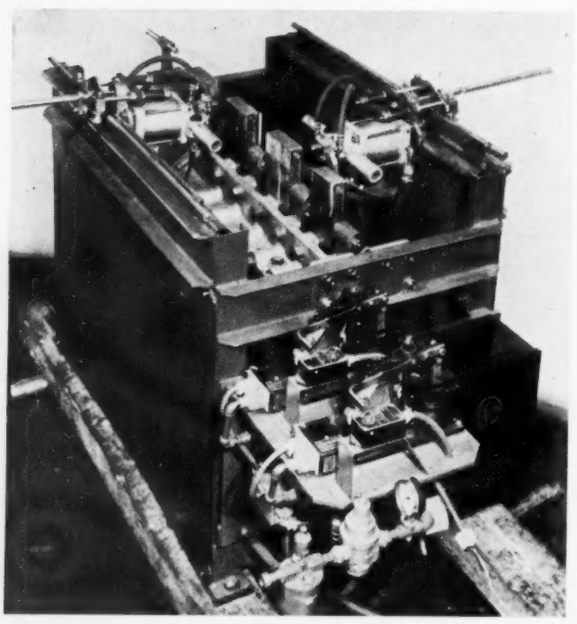
Butt Welding Field Needs Much Development

■ Welding short strip coils from the hot mill end to end to make long ones before reduction in the cold mills is now being carried out successfully by three entirely different welding processes—electric flash welding, carbon arc welding and automatic oxyacetylene blow pipes. Of these three processes, the flash welding is the fastest, making a 76-inch long weld in material ⅛-inch thick in about 15 seconds. Removal of the flash is accomplished with the strip in motion. In the gas and arc welding there is no flash to remove. Welds by all of the processes stand cold reduction of 4 to 1 to 8 to 1 without failure.

A singular lack of vision on the part of gas and electric arc welding engineers has retarded development of equipment and methods for high speed butt welding of strip between the gages of .060 and .125-inch. While flash welding appears unbeatable for speed, the immediate future needs for fabricating material of these gages involve jobs to which flash welding is difficult to apply. Spot welding such as is used in the high speed trains, aircraft, etc., is a temporary expedient which is used only because no suitable butt welding process is available. Gas welding in particular gives an excellent result in butt welding these thin materials at a cost for gases which is of no great consequence. With some vision and a good deal of hard work, the apparatus can be simplified and its cost reduced to a fraction of its present selling price.

Three 400-foot, long strip coils can be welded together into one coil having a length of 1200 feet with 152 inches of welding in the mill where the width is 76 inches. That is not much welding per ton. But when it is considered that the fabricators may eventually do 200 to 400 feet of welding on this material before it finally gets to the user, the significance of processes adaptable to this thin material is apparent.

Welds Frame From Three U-Channels



■ This Thomson jig-type welder was specially built to weld three U-channels into a frame on a production basis. Upright elements in the center are electrodes. The two air-operated guns at sides make the welds. Interlocked valves and limit switches permit only one gun to fire at a time. Welder is product of Thomson - Gibb Electric Welding Co., Lynn, Mass.

Whitey Sez:

"What we take out of something depends on what we put into it . . . Therefore, charging the electric furnace with top-notch materials means a better alloy steel; a better MAURATH *Rod, and a welding job better in every respect."*

MAURATH, INC. BUILDER OF BETTER WELDING ELECTRODES IN ALL ANALYSES

C L E V E L A N D

Effective Seals Developed For Car Type Furnaces

■ ANNEALING, normalizing and stress relieving of bulky material has been handled in car type furnaces for a long time because of the ease with which material can be loaded and unloaded. Since these operations are done by an overhead crane when the car is outside of the furnace, a wide range of articles can be handled easily and efficiently.

However, use of this convenient type of furnace has been handicapped from a heating standpoint in several ways. It is difficult to secure uniform temperatures throughout the heating chamber, particularly at the ends. Also, it has been difficult to seal the clearance space between the car and furnace side and end walls, resulting in considerable scale forming on the heated charge. Air leakage thus increases fuel costs and necessitates the expense of adding a descaling operation.

Gas Machinery Co., Cleveland, has developed a new design said to eliminate these difficulties and to make possible improved control of furnace temperature and atmosphere. Fig. 1 shows this simple development which is rugged and completely automatic in operation. It consists of a trough mounted on the car understructure and extending entirely around its sides and ends. With the car outside the furnace, the trough is normally in its lower position. When the car is run into the furnace to its proper location, car movement actuates a simple positive mechanism which automatically raises the trough to its sealing position.

The mechanism raising the trough is supported from the furnace foundation, its only moving part on the furnace car being the trough itself. With the car in its proper position in the furnace, the door is lowered and clamped to establish an airtight seal. Then it is only necessary to complete inlet and drain connections and to maintain a moderate circulation of water, oil or other liquid in the trough to keep the entire understructure of the car relatively cool. Vapor formation above the seal is minimized by the design of the trough and any vapor formed is removed by patented syphon vent flues before it can enter the heating chamber. This latter construction has been used by Gas Machinery Co. in its rotary hearth type furnace for a long time and has been found reliable.

This design assures a permanently tight seal and there is little to give trouble or require attention. Since furnace atmospheres can be held within close limits, oxidation is substantially reduced and formation of surface scale is minimized.

The furnace in Fig. 1 is the over-and-under-fired type commonly used for a variety of annealing and stress relieving operations. Many other types of firing can be utilized employing the same effective seal.

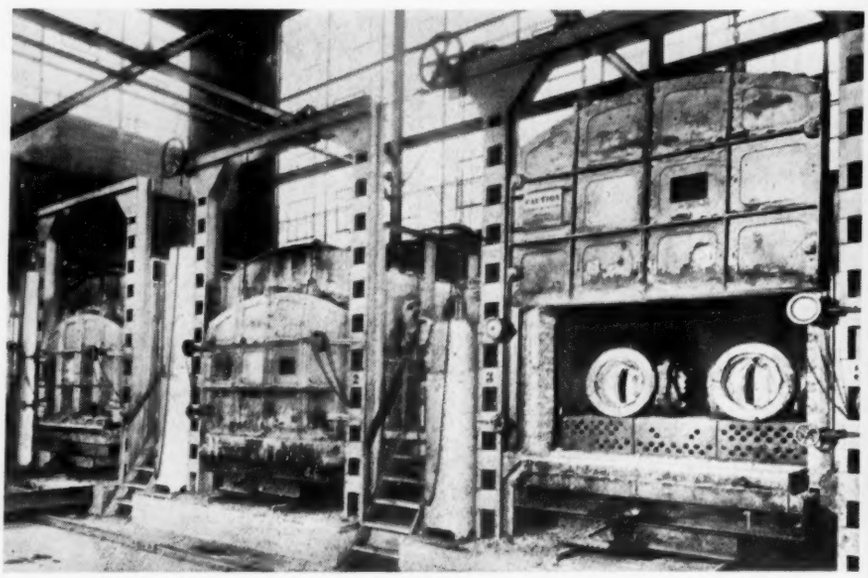


Fig. 2—Battery of car type furnaces served by transfer car seen on rails in front of furnaces at extreme left

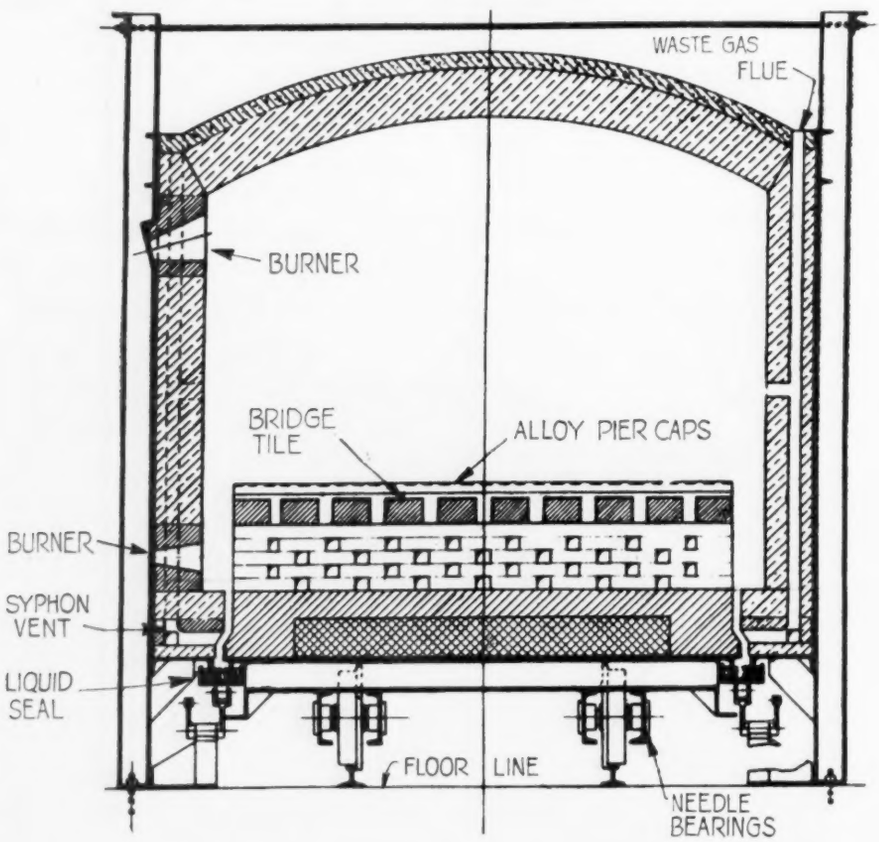
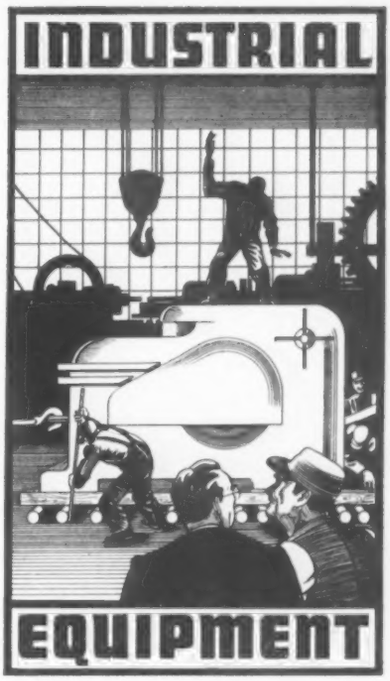


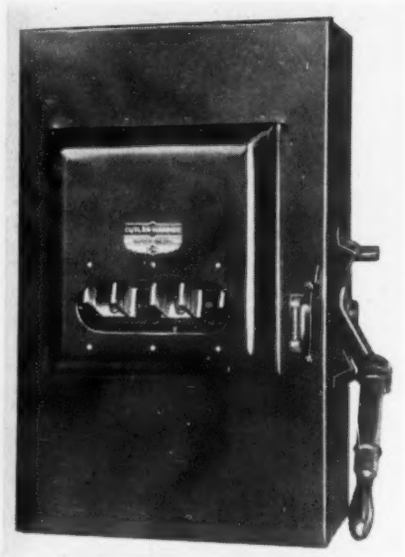
Fig. 1—Cross section view of car-type furnace showing liquid seal in trough around edge of car



Blades Inspected Through Window

■ Cutler-Hammer, Twelfth street & St. Paul, Milwaukee, has introduced a window type, mill duty, safety switch which can have its blades inspected from the outside.

Window of the safety switch is 3/16-inch shatter-proof glass held securely in place from the inside. A sponge rubber gasket cushions the glass and seals the opening in the cover. Basically, the window type line is the same as the company's type A line. It features quick contact and break mechanism, pressure type fuse clamps, noncurrent carrying hinge posts, silver plated blades and jaws, unit pole construction and interlocked cover with key release.



Cutler-Hammer safety switch can be inspected through a $\frac{3}{16}$-inch shatter-proof glass. Sponge rubber gasket cushions the glass in the unit

This latest line is available in standard sizes ranging from 30 to 1200 amperes up to 600 volts, fusible or nonfusible.

Rips Without Gouging

■ Ideal Commutator Dresser Co., has introduced a cable ripper which rips cables with one motion without the danger of cutting wires.

Ripper is squeezed onto the cable and pulled, ripping the cable without gouging. It also is used on nonmetallic sheathed duplex metals.

Miller Is Designed To Mill Intricate Parts

■ U. S. Tool Co., East Orange, N. J., has placed on the market a Multimiller unit which is designed for climb milling and conventional milling of small intricate parts on production basis.

Intricate cuts are made on this versatile machine automatically, and one person can operate from 1 to 6 millers, depending upon the job at hand. The cam method is used in controlling table movements. Where a cut is to be made to a prescribed depth, table movement of the unit will repeat desired cycle without variation. Each cam is provided with 8 cutting speeds. Time for the complete table cycle can be arranged from 5 seconds to 2 minutes. Flexibility of the unit is such that on climb milling, slow speed may be used while cutter is entering the work and later increased for the actual cutting. For conventional milling, cam is arranged for quick approach, slow cut and quick return.

Table is driven by means of a cam-operated sector which engages a rack. For conventional milling, table is moved to the cutter as radius of cam increases and exerts pressure on the cam roller. Table return stroke, in this case, is provided by a table-return counter weight. In climb milling the weight is reversed when the table is moved to the cutter. The change of cam contour determining the movement. Rotary attachments make it possible for the unit to operate as a continuous miller. Some of the work accomplished by this unit include continuous milling of formed stock, sewing machine parts, safety razor parts, electrical parts, motion picture equipment and complex spur gear cutting.

Telescopic Lifter Has 30-Foot Lift

■ Service Caster & Truck Co., Albion, Mich., has placed on the market an electrically operated, telescopic type, trailer lifter which can lift trailers as high as 30 feet.

This type of lifter is ideal for piling between trusses and under balconies. One man can operate the unit from the time he pushes his loaded trailer onto the lifter and completes his unloading. Lifter is supplied with a short ramp to facilitate the passage of the trailer. Once on the lifter, the trailer is kept from moving by the ramp which folds up behind the trailer. Mechanism of the lifter is controlled by a push button. To unload the trailer while suspended at various heights, operator walks on a tread steel walkway. This walkway when folded up, also serves to form a guard for the load to provide clearance in close quarters.

Two roller chains carry the load. Drive of the lifter, which is totally

A safety bar located on the top of the back screen of this Service Castor telescopic lifter shuts off the motor if it comes in contact with an overhead obstruction

enclosed, runs in a bath of oil. Lifter has a high torque motor provided with a built-in electric disk brake. If the power fails machine is adjusted so that it stops completely.

Portable Electric Hoist Has 500-Pound Capacity

■ Shaw-Box Crane & Hoist division, Manning Maxwell & Moore, Muskegon, Mich., has placed on the market a light weight, portable, electric hoist which has a lifting capacity of 500 pounds.

Hoist is small in size and compact. It is said to weigh less than a hand operated spur geared chain hoist of equal capacity, weighing approximately 58 pounds. Power for operation is received from an ordinary lighting socket.

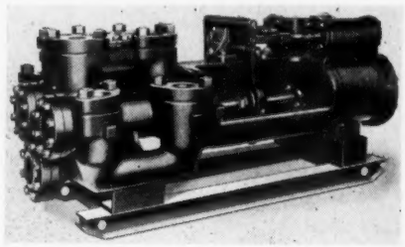
Regularly, the unit is equipped with enough lifting chain to give a lift of 10 feet. Additional lift is possible by lengthening the chain. Distance between the upper hook and load hook when at its highest position is 16 inches. With a 500 pound load, the unit has a lifting speed of 17 feet per minute.

Some of the hoist's safety features include one hand control, safety stops that prevent overtravel of hoist hook in either direction, spring cushioned load hook and an arrangement whereby load may be lowered either by gravity or power control. A roller type chain is employed. Gears and pinions are made from alloy steel with machine cut teeth. Load shaft is of nickel steel. Needle type roller bearings are used at all bearing points. Gear train consists of two gears and pinions. The hoist is totally enclosed, with the gearing operating in a bath of oil.

Steam Pump Offered For Economical Handling

■ Fairbanks Morse & Co., 900 South Wabash street, Chicago, has introduced a Duplex steam pump with both an 8-cover side-pot type fluid end and improved piston valve steam end.

Steam pump offers an economical means of handling oil, water or other free flowing liquids at high pressures and in large quantities, it is claimed. Pump was developed particularly for industrial and oil field boiler feed service, but is suited to general industrial, railroad and municipal applications. Sizes are

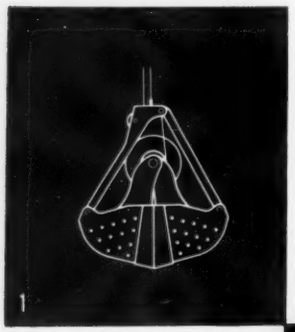


Sizes of this Fairbanks Morse steam pump are available for capacities up to 148 gallons per minute and fluid end pressures up to 1000 pounds per square inch

available for capacities up to 148 gallons per minute, and fluid end pressures up to 1000 pounds per square inch.

Balanced, piston-type steam valves assure efficient operation with high steam pressures and with superheated steam. Valve openings close completely under all conditions of temperature and pressure. An advantage of the 8-cover side-pot end is that it is easier to service. Each suction and discharge valve is located in its own valve pot and is easily accessible through the removal of a valve pot cover. Large fluid end passageways offer low resistance to flow.

Steam and fluid ends are each sealed by packing in a deep stuffing box fitted with a removable, bolted gland. Cradle between the steam and fluid ends is long enough to permit access to both stuffing boxes.



THERE'S A
BLAW-KNOX
BUCKET
FOR EVERY STEEL
PLANT SERVICE

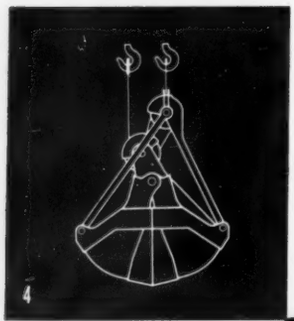
1 Granulated B. F. Slag, comparatively easy digging, permitting use of Blaw-Knox POWER WHEEL BUCKETS with large, hardened, slow-moving bearings—principally a maintenance problem.

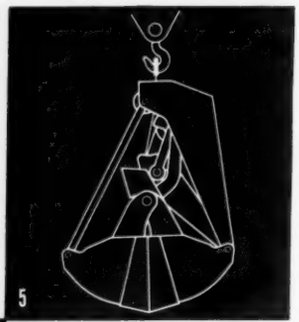
2 Blaw-Knox ORE BUCKETS four-rope type, low height for high storage, anti-friction sheave bearings—exceptional digging qualities developing 1 to 1 ratio or better.

3 Blaw-Knox Two Line Buckets for hard digging; built at weights suitable for handling O. H. slag, limestone, Spiegel, Ferro Mang., pig iron. Adaptable to overhead cranes and locomotive cranes.

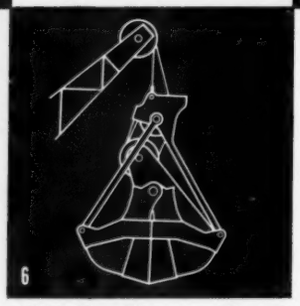
●

6 Blaw-Knox Two Line Buckets for locomotive cranes built at various weights to suit operating requirements including medium weight types adaptable to broad range of service.





4 When "hook-on" operation is necessary, much is gained by using Blaw-Knox 2 line type hook-on buckets. Especially suited to O. H. cinder yard service where 2 hooks are usually available.



5 Blaw-Knox Single Line "Hook-On" Buckets. Heavily built for O. H. service and medium weight types for handling roll scale, also for handling clay and other materials in O. H. Ladle House.

BLAW-KNOX DIVISION
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No part of the piston rod enters either stuffing box.

Same type of 8-cover, side-pot fluid end is available also in the Duplex power pumps for motor, belt or engine drive. These have enclosed self-oiling power ends with herringbone gears and large roller bearings.

Equipment Solves Research Problems

■ Harry W. Dietert Co., 9330 Roselawn avenue, Detroit, has placed on the market a spectrograph which is applicable to industrial control and research problems involving qualitative and quantitative analysis of

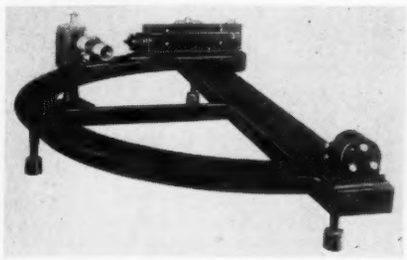


Illustration shows spectrograph with arc house grating and camera. With this equipment qualitative and quantitative analysis of ferrous and nonferrous metals can be obtained

ferrous and nonferrous metal, and a projection comparator which enables the operator to project on a screen the spectra of a known sample for rapid identification of elements present in qualitative analysis.

Spectrograph is of the grating type claimed to yield the highest resolution and dispersion with high sensitivity and speed. An arc or high voltage spark gap is obtainable to volatilize the metal being tested. Camera of the spectrograph utilizes a standard 35 millimeter motion picture film in a 100-foot roll. Each exposure is 12½ inches long covering 2200 Angstrom units of spectrum.

Unit Is Adapted To Detect Tramp Iron

■ Illinois Testing Laboratories, 420 La Salle street, Chicago, has placed on the market the Alnor forewarn, a metal detector which was modified for industrial use. Basically, the detector is the same as those used in penal institutions. Its modification has adapted the unit to detect tramp iron or steel in various products or materials.

Detector consists of a search coil, amplifier and supervisory signals. Amplifier and signals may be made as an integral part of the coil system or they may be remotely located. Failure of tubes, transformer, relay or coil system is quickly revealed. Unit also is equipped with a standard micro-control to facilitate adjustment.

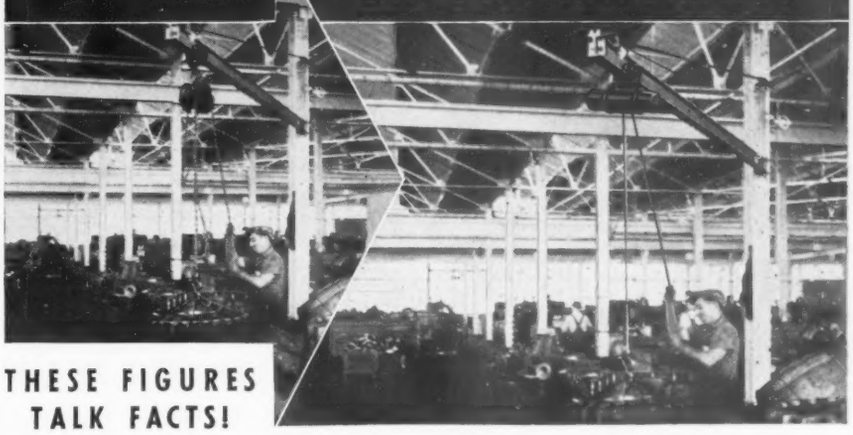
Applications of the unit are unlimited, it is claimed. A typical method of search involving the instrument is the examination of bales of scrap brass for tramp iron prior to resmelting. Detector can also be mounted on conveyor belts. Presence of tramp iron on the belt causes a momentary reversal of the conveyor system with a consequent discharge of the contaminated material.

Desuperheater Designed For Process Work

■ Northern Equipment Co., Erie, Pa., has introduced a Copes desuperheater designed for either total or partial elimination of the superheat from steam to be used for process work, or for auxiliaries built for reduced-temperature steam.

Unit operates on steam from 212

Saves $2262.85 a Year ON ONE MACHINE!



THESE FIGURES TALK FACTS!

In this large machine shop, 80 lb. castings were lifted by hand up to the machine tool. Total annual cost of handling by hand — $3456.00, *not including* loss due to lower production and machinist fatigue. P&H engineers recommended a 500-lb. capacity P&H Electric Hoist to operate on a 20-ft. jib over the machine, cutting hoisting time 66%. Total annual cost including cost of hoist, labor, depreciation, upkeep, interest and power — $1193.15. Total annual savings — $2262.85 *on one machine!*

HANDLE IT "*Thru the Air*" with P&H HOISTS

Just as they did in this shop, P&H Hoists can mean big savings in handling costs in *your* plant. With "thru the air" handling you end manual lifting of loads from 15 pounds to 15 tons — cut production lag, make men *good* workmen 8 hours every day.

Easy to install, low in cost, P&H Hoists are available in any one of several mountings — bolt, lug, trolley, hook or high-lift suspension. Whether you're working with steel or cotton, ice or leather, paper or wire, it will pay you to investigate the possibilities of "thru the air" handling. Its push-button efficiency obsoletes old methods of lifting, lowering or moving of materials.

Free THE ENGINEERING LAYOUT THAT SOLVED THIS PROBLEM!

This drawing shows you, in engineering terms, how P&H Hoists brought new efficiency to this machine shop. It will help you do the same for yours. Send for it now!

USE THIS COUPON TODAY!

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Please send me machine shop layout No. 101

Firm Name _____

By _____ Title _____

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to 1100 degrees Fahr., maintaining within close limits the desuperheated steam temperature, regardless of changes in temperature of the superheated steam.

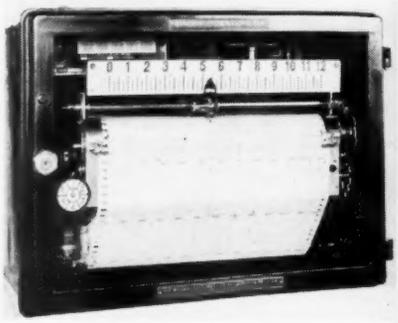
Desuperheater is installed in the steam line as a complete unit. The only connections needed are a water supply for desuperheating, a water or air pressure line for the diaphragm operator, and a drain to carry off excess condensate brought over by the steam when the desuperheater is cut into service.

Flow of cooling water is controlled at the spray nozzle. A constant pressure drop is maintained across the nozzle, permitting a continuous supply of cooling water to be sprayed into the superheated steam in exact proportion to the demands. This plus the action of the thermostatic temperature control element assures dependable operation, it is claimed.

Boiler feed water can be used as a cooling water supply. Air or water is used to actuate the pilot operator of the water control valve. External adjustments permit varying the degree of desuperheat and the sensitivity of control. Unit is easily dismantled for cleaning by removing the lower cover of mixing chamber.

Several Recordings Given Simultaneously

■ Brown Instrument Co., division of Minneapolis-Honeywell Regulator Co., Philadelphia, has introduced a multiple recording potentiometer



Wide 12-inch chart with numerals of various colors facilitates the reading of this Brown multiple recording potentiometer pyrometer

pyrometer which is said to record several temperatures on one chart.

The instrument features the plus symbol which is used in conjunction with a numeral and identifies the thermocouple from which the temperature record is being made. The plus sign is said to have a definite and practical significance in multiple temperature recording. The vertical line of the symbol identifies the temperature and the horizontal line the time co-ordinate. Intersection of the two lines locates the exact point of the time-temperature record.

The recorder has a wide, 12-inch chart which, with the aid of the imprint made by the number, print wheel, makes it possible to continuously record from two to six temperatures from as many different thermocouples. Numerals of various colors facilitate reading of the chart.

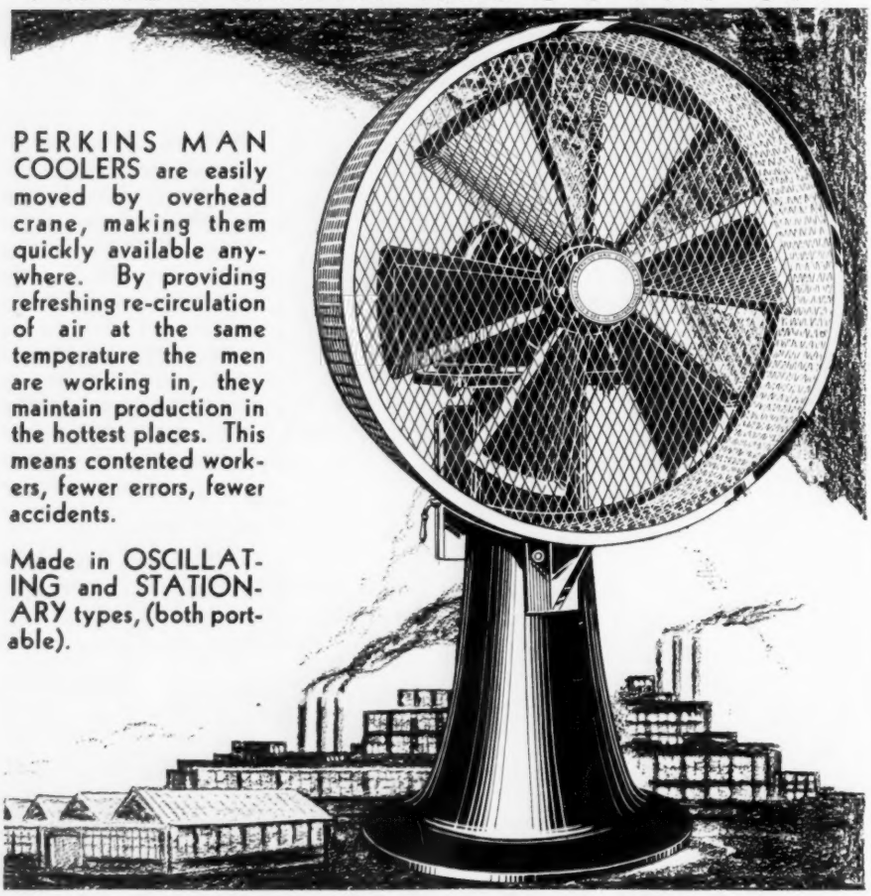
Unit is enclosed in a galvanometer. Its other features include a 40-inch slide wire, drive mechanism and synchronous motor.

Lathe Has More Power

■ Axelson Mfg. Co., 6160 South Boyle avenue, Los Angeles, has placed on the market an improved, heavy-duty precision lathe which, when used for ordinary set-up work, the tailstock spindle is quickly moved in and out, while for drilling operations, machine is shifted to slow speed which gives powerful action without the necessity of using a bar in the handwheel.

Machine has a new tailstock with the handwheel located at the front

ORIGINAL *and* ONLY
MAN COOLER
TRADE MARK · REG · U · S · PAT · OFF ·



PERKINS MAN COOLERS are easily moved by overhead crane, making them quickly available anywhere. By providing refreshing re-circulation of air at the same temperature the men are working in, they maintain production in the hottest places. This means contented workers, fewer errors, fewer accidents.

Made in OSCILLATING and STATIONARY types, (both portable).

B. F. PERKINS & SON, *Inc.*
Engineers and Manufacturers
HOLYOKE · MASSACHUSETTS

of the body. Spindle travel, in relation to the handwheel movement, is fast and affords easier operation it is claimed. The lathe has a chatter-proof covered, tapered attachment and a thread chasing dial which indicates the correct position for half-nut engagement. Enclosed lathe apron forms an oil reservoir from which all operating parts are lubricated. Reverse mechanism on the change gear train is completely enclosed.

Portable Sander Speed Is Increased

■ Mall Tool Co., 7740 South Chicago avenue, Chicago, has introduced a portable electric disc sander which is recommended for grinding and smoothing welds, steel and iron castings, auto body and fender work and removing rust and scale.

A heavy-duty, ball bearing motor operates the sander at a speed of 4500 revolutions per minute. Standard equipment includes 20 feet of 3 conductor cord and rubber plug,

A heavy-duty, ball bearing motor operates illustrated Mall portable disc sander at a speed of 4500 revolutions per minute

heavy-duty switch, a 7-inch pad and one abrasive for metal sanding. A cup shaped grinding wheel or wire brush can be substituted for the pad and abrasive disk, if desired.

Bearings Designed For Opposed Mounting

■ Norma-Hoffmann Bearings Corp., Stamford, Conn., has placed on the market two types of precision bearings which have been designed for opposed mounting in electric motors and similar equipment.

The two types of bearings are known as the WIR and WIR-L series of ball bearings. Outstanding feature of the bearings is the use of a wide, inner ring of double-row bearing width in combination with an outer ring of single-row width. Inner ring is said to insure a better sealing on the shaft. And also, it eliminates the necessity for threading the shaft and applying lock nuts or other locking devices. This elimination of threads permits a larger shaft extension diameter for a given bearing bore and avoids weakening of the shaft by threading.

WIR ball bearings are available in the medium metric series from 25 to 55 millimeter bore, and the WIR-L cylindrical roller bearings, with one-lipped outer ring, are available from 30 to 130 millimeter bore.

Burner Is Equipped For Triple Automization

■ Mahr Mfg. Co., division of Diamond Iron Works Inc., Minneapolis, has introduced a triple atomizing burner suitable for furnaces designed for forging, welding and other heat treating processes. Burner is claimed to atomize fuel, mix with air and deliver combustible mixture to combustion duct or chamber in correct form and velocity to produce the maximum of heat from a given volume of fuel.

Oil burner is designed for operation with air pressures from 10 to 14 ounces per square inch. Fuel passes over three separate atomizing surfaces causing fine atomization and thorough mixing.

Entire burner body may be dismounted without detaching the air line, or entire internal unit may be removed for cleaning by the re-

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moval of 3 cap screws. When low pressure gas is used as fuel, a special gas unit is installed in place of the oil unit. Burner may be operated interchangeably without changing the internal unit when high pressure gas is used.

Type G oil control valve and type F oil strainer are furnished with all triple atomizing burners. These insure steady flow of oil to burner and eliminates constant adjusting. Burner is made in 6 sizes.

Cleans and Lubricates

■ American Chain & Cable Co., York, Pa., has placed on the market an Acco-Morrow pressure lubricator which lubricates the gears and other moving parts of machinery at a high pressure approaching 1000 pounds, assuring lubrication to all parts.

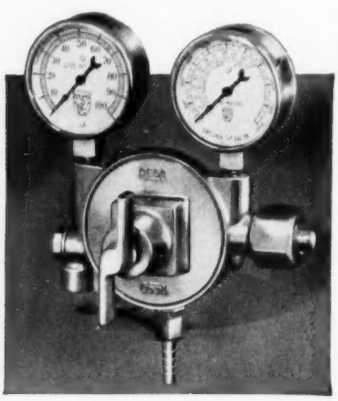
Active parts of the lubricator are made of brass or steel, and machined. Tip of lubricator, which is made of compressible composition, is one of the main features of the unit. It makes a pressure-tight contact on the top of any common oil hole, and the usual sizes and types of cups and oil hole covers in general use. The lubricator exerts such a pressure that it flushes out grit and dirt from a machine, it is claimed, and at the same time forces oil into the bearings.

High Temperature Gases Controlled by Regulator

■ Bastian-Blessing Co., 240 East Ontario street, Chicago, has placed on the market a streamlined, 2-stage regulator, the application of which covers the control of oxygen, acetylene, hydrogen, nitrogen and other high temperature gases. Body of the compact unit is of forged brass.

Regolator combines a positive, direct first-stage nozzle type regulator and a second-stage inverse or stem type regulator. This combination is said to neutralize the characteristic discrepancies of each and result in a constant flow of gas, regardless of cylinder pressure fluctuations from full to empty.

One of the outstanding developments found in the Regolator is a triple filter, cartridge type strainer. Its filtering area is said to be 17 times as great as that contained in ordinary regulators. Rust, dust and dirt, which are common causes of regulator ailments, are easily removed by the strainer. It also serves to dissipate the heat of compression caused by the quick opening of an oxygen cylinder valve, thus eliminating seat ignition. Unit is adapted for many high pressure gas applications.



A triple filter, cartridge type strainer is a feature of this Bastian - Blessing 2 - stage gas regulator

Tap Life Extended

■ Carboloy Co., 2985 East Jefferson avenue, Detroit, has introduced a tap made of solid Carboloy cemented carbide for use on unfired porcelain.

Tap is 1¾ inches long with a .153-inch diameter. It has a full V-thread. A similar tap which has been in service, has tapped 70,000 holes before the first regrind. The estimated life of the new tap is claimed to be for 280,000 holes.

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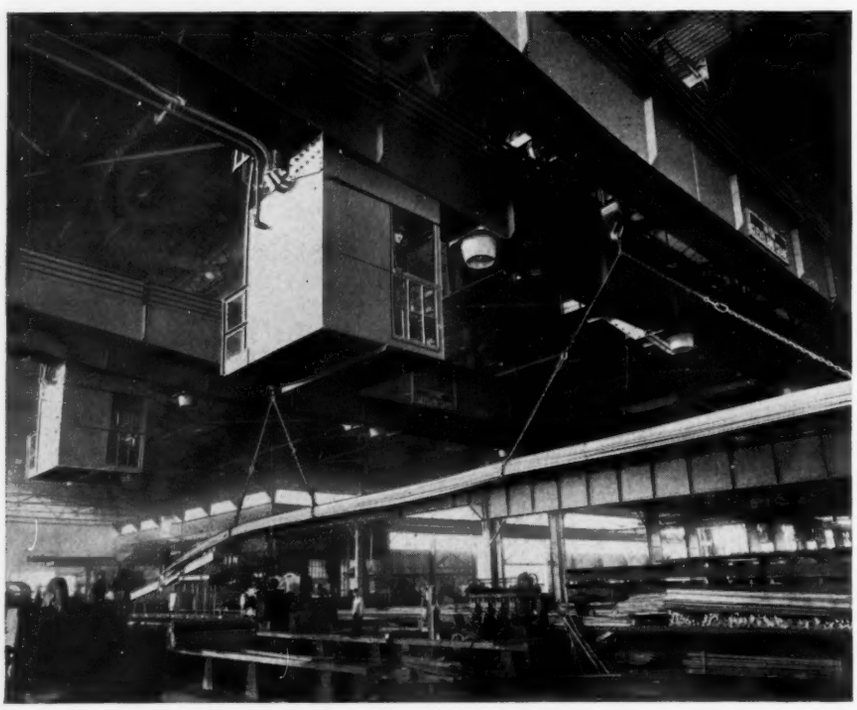
All Welded for Every Industry



• An installation in a Steel Mill for heavy continuous service, of two 10 Ton 96' Span All Welded Roller Bearing Cranes.

ALSO BUILDERS OF CLEVELAND TRAMRAIL MATERIALS HANDLING EQUIPMENT

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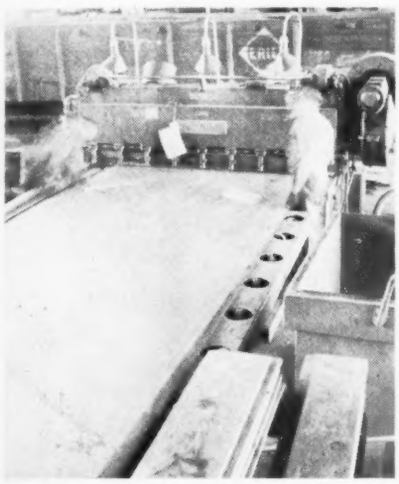
Caster Table Built For Feeding Shear

(*Concluded from Page* 55)

caster, of the type used in truck construction, and the arrangement and height dimension of the boxed top is such that the caster, when mounted in inverted position, has its top tangent lying just a little above the surface of the boxed top. Thus,



Casters support the large sheets fed into this shear, enabling operator to move them easily in any direction

the piece of sheet steel being sheared does not contact the table top proper to any appreciable extent, but is supported by casters. Since the casters swivel readily in their mountings, it is a simple matter to roll a piece of sheet steel in any direction, or to manipulate it for shearing to line, or otherwise.

•

Cupola Operation from German Point of View

■ *Construction and Operation of the Cupola, Part II,* by L. Schmid; paper, 235 pages, 6⅜ x 9¼ inches; published by Wilhelm Knapp, Halle (Saale), Germany; supplied by STEEL, Cleveland, in Europe by Penton Publishing Co. Ltd., Caxton House, Westminster, London.

This book, which is in German, is one of a series comprising a reference library on "Works Practice in Iron, Steel and Metal Foundries", edited by Hubert Hermanns. It is No. 20 of the series, and is the second part on construction and operation of the cupola, dealing with operation.

The volume is divided into four sections relating to various phases of cupola operation. The first deals with raw materials for the cupola and gives information on foundry pig iron, cast scrap, steel scrap, briquetted boring, ferroalloys, foundry coke, and slagging materials. The second section discusses the chemical and physical reactions in the cupola stack and relates to such phases as changes in the ascending gas stream, changes in the descending charge, heat balance and efficiency of some special cupola processes.

The third section covers determination of the size of, and the building up of the iron charge. It discusses the various components of cast iron, evaluation and application of raw materials, determination of the charge, and the composition of iron charges for special castings. The fourth section describes supervision of cupola operation and relates to raw and other materials, cupola wind, combustion processes and molten iron.

Magnesium and Alloys Discussed in New Volume

■ *Magnesium and Its Alloys,* by J. L. Haughton and W. E. Prytherch; board, 100 pages, 6 x 9½ inches; published by His Majesty's Stationery Office, London, Eng.; supplied by STEEL, Cleveland; in Europe by the Penton Publishing Co. Ltd., Caxton House, Westminster, London.

During the past five years an investigation of magnesium and its alloys has been conducted at the National Physical Laboratory, Teddington, Eng., and while numerous results were published, considerable material was unpublished till now.

The work is divided into seven chapters of which the first deals with sources, production and properties of magnesium. Chap. II discusses melting and casting briefly, while Chap. III describes plastic deformation of magnesium and its alloys. Rolling, forging, extrusion and heat treatment of magnesium and its alloys are the topics of Chap. IV, and Chap. V presents detailed data on the mechanical properties of magnesium alloys at room temperature. Chap. VI describes the mechanical properties of magnesium alloys at elevated temperatures and Chap. VII discusses the constitution of the alloys of magnesium.

Chemistry Handbook in New, Revised Edition

■ *Lange's Handbook of Chemistry,* by W. A. Lange, fabrikoid, 1780 pages, 5¼ x 7¾ inches, published by Handbook Publishers Inc., Sandusky, O., and supplied by STEEL, Cleveland, for $6; and in Europe by Penton Publishing Co. Ltd., Caxton House, Westminster, London.

The second edition of this handbook, which first was published in September, 1934, has been revised to bring it up to date. It has been enlarged by 237 pages. The present volume contains 16 new tables, and 15 major revisions and 16 minor revisions have been made in tables which appeared in the previous edition. Data cover a wide range. This handbook will be found useful in the library of the chemist, physicist, engineer and manufacturer.

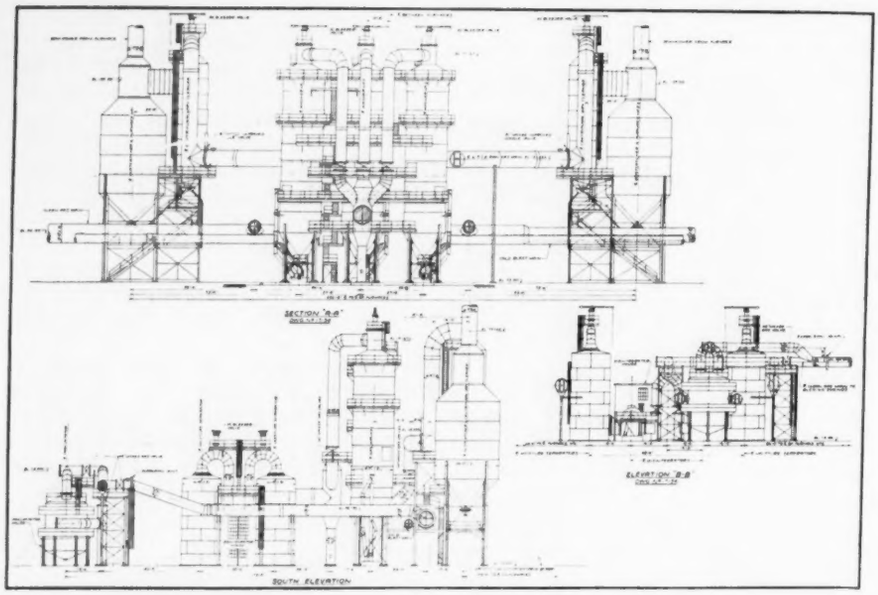


Fig. 9—Elevation drawing of gas cleaning plant

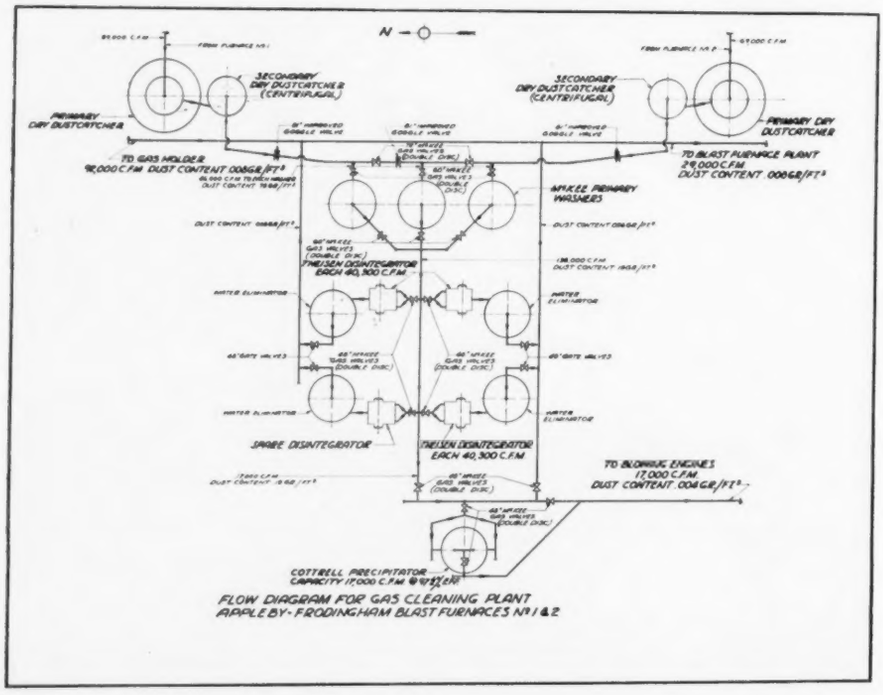
(*Continued from Page* 53)

ple, some of the earliest gas blowing engines ever installed, were at the old Frodingham plant, and these engines are still in service. The newer Appleby furnaces are blown exclusively with gas engines. The American tendency, of course, has been strongly toward turboblowers, but it could not be demonstrated that the furnaces at Scunthorpe could be blown at lower total cost by this method. The new plant will use German made gas blowers of 66,000 cubic foot capacity.

Gas cleaning at Appleby-Frodingham has mostly been done by the Halberg-Beth system, and there is much to be said in its favor. The reported cleanliness of gas, 0.002 grains per cubic foot, exceeds anything we are accustomed to in this country, and this fact perhaps has had something to do with the pronounced success with gas blowing engines. Our inclination, of course, is toward electrostatic cleaning by the Cottrell wet system. Disintegrators, however, also become competitive at Scunthorpe because of the cheapness of electric power, and this type of equipment was finally chosen for cleaning all except the gas for blowing engines. Halberg-Beth was eliminated partly because at the new plant much higher top gas pressures will obtain than

Fig. 11—Aerial view of plant at beginning of construction

Fig. 10—Flow diagram and arrangement of gas cleaning plant



is customary where this system has been used. At the present plant the top gas pressures are only 1 or 2 inches, water gage. Arrangement and flow diagram of the gas cleaning plant is shown in Fig. 10.

For cleaning the blowing engine gas a typical American Cottrell unit will be installed, with means of furnishing it with semicleaned gas from either the primary scrubbers or the disintegrators. The Scunthorpe unit will be the first of the American type to be installed in Europe. Blast furnace gas at Scunthorpe, as at many British plants, is more widely used throughout the steel plant and mills than in most American steelworks. All the furnace gas, therefore, must be carefully cleaned. Guarantees at the new plant call for 0.004 grains per cubic foot maximum.

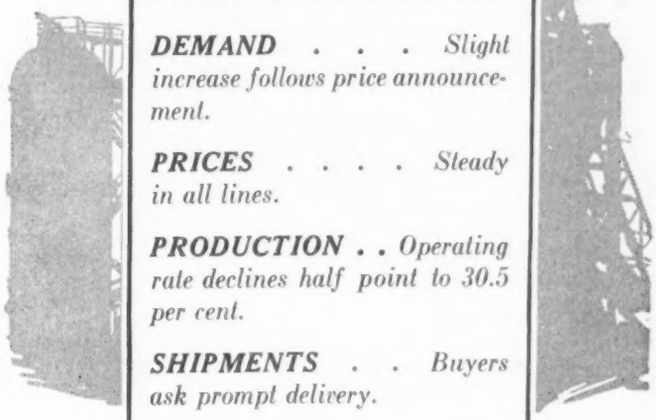
(*Concluded next week*)

Slight Upturn Appears in Steel Buying

Pig Iron Prices

Are Held Steady;

Auto Output Sags



MARKET IN TABLOID

DEMAND . . . *Slight increase follows price announcement.*

PRICES . . . . *Steady in all lines.*

PRODUCTION . . *Operating rate declines half point to 30.5 per cent.*

SHIPMENTS . . *Buyers ask prompt delivery.*

■ SLIGHT improvement in buying of steel is noted by producers, the increase being well spread over various lines, light products predominating.

Announcement of prices for second quarter without change has had some effect but it appears probable that other deterring factors must also be cleared up before any substantial advance in demand will be developed. Seasonal requirements are expected to give some impetus.

Leading steelmakers report sales during February 20 to 25 per cent above January. Immediate shipment generally is specified, indicating reserve stocks are low.

Following price announcement on steel, pig iron producers have reaffirmed the quotations for second quarter.

A reflection of the Far Eastern situation is seen in reduction of price on tungsten high-speed tool steel from 80 to 67 cents per pound, following lower prices on tungsten, as shipments from China have increased.

Railroads find pressure for new equipment so insistent that a few orders for cars and locomotives, with some small rail tonnages, are coming out. This gives rise to expectation of considerable buying if freight rates are advanced.

Steelworks operations last week receded half a point to 30.5 per cent, with no indications of an important change this week. Pittsburgh lost 1 point to 28 per cent, Wheeling 6 points to 38 per cent, Cleveland 2 points to 31 and Detroit 5 points to 43. Cincinnati increased its rate 13 points to 35 per cent. There was no change at Chicago at 24.5 per cent, Eastern Pennsylvania at 30, Youngstown at 29, Buffalo at 21, Birmingham at 61, New England at 27 and St. Louis at 28.

Automobile assemblies sagged to 56,977, compared with 59,100 the week before. General Motors produced 21,950, against 21,560 the preceding week; Chrysler's output was 10,450, compared with 9850; Ford dropped to 15,570 from 19,265. Other producers built 9007, compared with 8425.

January steel exports were 229,565 gross tons, 77,082 tons below December but close to the monthly average for 1937. Although steel ingots, pig iron and tin plate continued to lead in volume, each was considerably below the preceding month. Scrap shipments were 356,537 tons, considerably above December and also above the monthly average for 1937. European outlets took more than 230,000 tons of the total and Japan only 31,000 tons.

Continued weakness in scrap, with practically no buying and little material offered has resulted in a practical stalemate, quotations in many cases being nominal in the absence of transactions on which to base figures. Export buying, especially in the East, is almost the only support and this has become less recently. Until steel production gains a higher level there is no reason to expect the scrap market to move materially. Meanwhile most mills have fairly large accumulations and are inclined to buy only when bargains offer.

Slight weakening in the East last week caused STEEL's composite of steelmaking scrap to decline 8 cents to $13.25. This is a loss of 65 cents during February. The same influence caused the iron and steel composite to drop 4 cents to $38.84. The finished steel composite remained unchanged at $61.70.

STEEL's London cable indicates relaxation of tension in steel demand in Great Britain and also in export markets depending on the Continent. Great Britain's need for semifinished steel is becoming less and import duties may be reimposed soon, after having been suspended during the period of shortages. The fixed quota for such imports is sufficient for current needs.

COMPOSITE MARKET AVERAGES

	Feb. 26	Feb. 19	Feb. 12	One Month Ago Jan., 1938	Three Months Ago Nov., 1937	One Year Ago Feb., 1937	Five Years Ago Feb., 1933
Iron and Steel	$38.84	$38.88	$38.94	$38.95	$38.96	$36.74	$27.94
Finished Steel	61.70	61.70	61.70	61.70	61.70	55.92	45.35
Steelworks Scrap ..	13.25	13.33	13.75	13.85	13.32	19.19	6.33

Iron and Steel Composite:—Pig iron, scrap, billets, sheet bars, wire rods, tin plate, wire, sheets, plates, shapes, bars, black pipe, rails, alloy steel, hot strip, and cast iron pipe at representative centers. Finished Steel Composite:—Plates, shapes, bars, hot strip, nails, tin plate, pipe. Steelworks Scrap Composite:—Heavy melting steel and compressed sheets.

COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for Last Month, Three Months and One Year Ago

Finished Material

	Feb. 26, 1938	Jan. 1938	Nov. 1937	Feb. 1937
Steel bars, Pittsburgh	2.45c	2.45c	2.45c	2.20c
Steel bars, Chicago	2.50	2.50	2.50	2.25
Steel bars, Philadelphia	2.75	2.75	2.74	2.49
Iron bars, Terre Haute, Ind.	2.35	2.35	2.35	2.10
Shapes, Pittsburgh	2.25	2.25	2.25	2.05
Shapes, Philadelphia	2.465	2.46½	2.455	2.25½
Shapes, Chicago	2.30	2.30	2.30	2.10
Tank plates, Pittsburgh	2.25	2.25	2.25	2.05
Tank plates, Philadelphia	2.445	2.44½	2.435	2.23½
Tank plates, Chicago	2.30	2.30	2.30	2.10
Sheets, No. 10, hot rolled, Pitts.	2.40	2.40	2.40	2.15
Sheets, No. 24, hot ann., Pitts.	3.15	3.15	3.15	2.80
Sheets, No. 24, galv., Pitts.	3.80	3.80	3.80	3.40
Sheets, No. 10, hot rolled, Gary	2.50	2.50	2.50	2.25
Sheets, No. 24, hot anneal., Gary	3.25	3.25	3.25	2.90
Sheets, No. 24, galvan., Gary	3.90	3.90	3.90	3.50
Plain wire, Pittsburgh	2.90	2.90	2.90	2.60
Tin plate, per base box, Pitts.	$5.35	$5.35	$5.35	$4.85
Wire nails, Pittsburgh	2.75	2.75	2.75	2.25

Semifinished Material

Sheet bars, open-hearth, Youngs.	$37.00	$37.00	$37.00	$34.00
Sheet bars, open-hearth, Pitts.	37.00	37.00	37.00	34.00
Billets, open-hearth, Pittsburgh	37.00	37.00	37.00	34.00
Wire rods, No. 5 to 9/32-inch, Pitts.	47.00	47.00	47.00	43.00

Pig Iron

	Feb. 26, 1938	Jan. 1938	Nov. 1937	Feb. 1937
Bessemer, del. Pittsburgh	$25.26	$25.26	$25.26	$22.30
Basic, Valley	23.50	23.50	23.50	20.50
Basic, eastern del. East. Pa.	25.34	25.34	25.26	22.51
No. 2 fdy., del. Pittsburgh	25.21	25.21	25.21	22.21
No. 2 fdry., Chicago	24.00	24.00	24.00	21.00
Southern No. 2, Birmingham	20.38	20.38	20.38	17.63
Southern No. 2, del. Cincinnati	23.89	23.89	23.89	20.94
No. 2X eastern, del. Phila.	26.215	26.21½	26.135	23.38½
Malleable, Valley	24.00	24.00	24.00	21.00
Malleable, Chicago	24.00	24.00	24.00	21.00
Lake Sup., charcoal, del. Chicago	30.24	30.24	30.14	26.54
Gray forge, del. Pittsburgh	24.17	24.17	24.17	21.17
Ferromanganese, del. Pittsburgh	107.49	107.49	107.35	84.79

Scrap

Heavy melting steel, Pittsburgh	$13.75	$14.05	$14.10	$19.65
Heavy melt. steel, No. 2, E. Pa.	12.75	14.05	12.25	17.75
Heavy melting steel, Chicago	11.75	13.25	12.55	19.50
Rails for rolling, Chicago	15.25	14.90	15.10	20.75
Railroad steel specialties, Chicago	14.25	15.75	16.75	21.00

Coke

Connellsville, furnace, ovens	$4.25	$4.25	$4.37	$4.00
Connellsville, foundry, ovens	5.25	5.25	5.25	4.25
Chicago, by-product foundry, del.	11.00	11.00	11.00	11.00

STEEL, IRON, RAW MATERIAL, FUEL AND METALS PRICES

Except when otherwise designated, prices are base, f.o.b. cars.

Sheet Steel

Prices Subject to Quantity Extras and deductions (Except Galvanized)

Hot Rolled No. 10, 24-48 in.

Pittsburgh	2.40c
Gary	2.50c
Chicago, delivered	2.53c
Detroit, del.	2.60c
New York, del.	2.74c
Philadelphia, del.	2.70c
Birmingham	2.55c
St. Louis, del.	2.63c
Granite City, Ill.	2.60c
Pac. base pts. f.o.b. cars	2.97½c

Hot Rolled Annealed No. 24

Pittsburgh	3.15c
Gary	3.25c
Chicago, delivered	3.28c
Detroit, delivered	3.35c
New York, delivered	3.49c
Philadelphia, del.	3.45c
Birmingham	3.30c
St. Louis, del.	3.38c
Granite City, Ill.	3.35c
Pac. base pts. f.o.b. cars	3.82½c

Galvanized No. 24

Pittsburgh	3.80c
Gary	3.90c
Chicago, delivered	3.93c
Philadelphia, del.	4.10c
New York, delivered	4.14c
Birmingham	3.95c
St. Louis, del.	4.03c
Granite City, Ill.	4.00c
Pac. base pts. f.o.b. cars	4.42½c

Tin Mill Black No. 28

Pittsburgh	3.30c
Gary	3.40c
St. Louis, delivered	3.53c
Granite City, Ill.	3.50c

Cold Rolled No. 10

Pittsburgh	3.00c
Gary	3.10c
Detroit, delivered	3.21c
Philadelphia, del.	3.30c
New York, del.	3.34c
St. Louis, del.	3.23c
Granite City, Ill.	3.20c
Pac. base pts. f.o.b. cars	3.62½c

Cold Rolled No. 20

Pittsburgh	3.45c
Gary	3.55c
Detroit, delivered	3.66c
Philadelphia, del.	3.75c
New York, del.	3.79c
St. Louis	3.68c
Granite City, Ill.	3.65c

Enameling Sheets

Pittsburgh, No. 10	2.90c
Pittsburgh, No. 20	3.50c
Gary, No. 10	3.00c
Gary, No. 20	3.60c
St. Louis, No. 10	3.13c
St. Louis, No. 20	3.73c

Tin and Terne Plate

Gary base, 10 cents higher

Tin plate, coke (base box) Pittsburgh	$5.35
Waste-waste, 2.80c; strip	2.50c
Long ternes, No. 24, unassorted, Pitts.	4.10c

Corrosion and Heat-Resistant Alloys

Pittsburgh base, cents per lb.

Chrome-Nickel

	No. 302	No. 304
Bars	24.00	25.00
Plates	27.00	29.00
Sheets	34.00	36.00
Hot strip	21.50	23.50
Cold strip	28.00	30.00

Straight Chromes

	No. 410	No. 430	No. 442	No. 446
Bars	18.50	19.00	22.50	27.50
Plates	21.50	22.00	25.50	30.50
Sheets	26.50	29.00	32.50	36.50
Hot strip	17.00	17.50	23.00	28.00
Cold stp.	22.00	22.50	28.50	36.50

Steel Plate

Pittsburgh	2.25c
New York, del.	2.54c
Philadelphia, del.	2.44½c
Boston, delivered	2.66c
Buffalo, delivered	2.49½c
Chicago or Gary	2.30c
Cleveland, del.	2.45½c
Birmingham	2.40c
Coatesville, base	2.35c
Sparrows Pt., base	2.35c
Pacific basing points, f.o.b. cars	2.82½c
St. Louis, delivered	2.52c

Structural Shapes

Pittsburgh	2.25c
Philadelphia, del.	2.46½c
New York, del.	2.51¼c
Boston, delivered	2.64½c
Bethlehem	2.35c
Chicago	2.30c
Cleveland, del.	2.46c
Buffalo	2.35c
Gulf Ports	2.66c
Birmingham	2.40c
Pacific coast basing pts., f.o.b. cars	2.82½c
St. Louis, del.	2.52c

Bars

Soft Steel

(Base, 3 to 25 tons)

Pittsburgh	2.45c
Chicago or Gary	2.50c
Duluth	2.60c
Birmingham	2.60c
Cleveland	2.50c
Buffalo	2.55c
Detroit, delivered	2.60c
Pacific coast basing pts., f.o.b. cars	3.02½c
Philadelphia, del.	2.75c
Boston, delivered	2.86c
New York, del.	2.79c

Rail Steel

To Manufacturing Trade

Pittsburgh	2.30c
Chicago or Gary	2.35c
Cleveland	2.35c
Moline, Ill.	2.35c
Buffalo	2.40c
Birmingham	2.45c

Iron

Terre Haute, Ind.	2.35c
Chicago	2.40c
Philadelphia	2.64c
Pittsburgh, refined	3.50-8.00c

Reinforcing

New billet, straight lengths, quoted by distributors

Pittsburgh	2.45c
Chicago, Gary, Buffalo, Cleve., Birm., Young...	2.50c
Gulf ports	2.85c
Pacific coast ports, f.o.b. car docks	2.95c
Philadelphia, del.	2.75c

Rail steel, straight lengths, quoted by distributors

Pittsburgh	2.30c
Chicago, Buffalo, Cleveland, Birm., Young...	2.35c
Gulf ports	2.80c

Wire Products

Prices apply to mixed carloads, base; less carloads subject to quantity extras.

Base Pitts.-Cleve. 100 lb. keg.

Standard wire nails	$2.75
Cement coated nails	$2.75

(Per pound)

Polished staples	3.45c
Galv. fence staples	3.70c
Barbed wire, galv.	3.40c
Annealed fence wire	3.15c
Galv. fence wire	3.55c
Woven wire fencing (base C. L. column)	.74
Single loop bale ties, (base C. L. column)	.63

To Manufacturing Trade

Plain wire, 6-9 ga.	2.90c
Galvanized wire	2.95c

Anderson, Ind. (merchant products only) and Chicago up $1; Duluth and Worcester up $2; Birmingham up $3.

Spring wire, Pitts. or Cleveland	3.50c

Do., Chicago up $1, Worc. $2.

Cold-Finished Carbon Bars, Shafting

Pittsburgh	2.90c
Chicago	2.95c
Gary, Ind.	2.95c
Detroit	2.95c
Cleveland	2.95c
Buffalo	3.00c

Subject to quantity deductions and extras. List dated Aug. 26, 1935; revised Oct. 1, 1936.

Alloy Steel Bars (Hot)

(*Base, 3 to 25 tons*)

Pittsburgh, Buffalo, Chicago, Massillon, Canton, Bethlehem 3.00c

S.A.E.	Alloy Diff.	S.A.E.	Alloy Diff.
2000	0.35	3100	0.70
2100	0.75	3200	1.35
2300	1.55	3300	3.80
2500	2.25	3400	3.20

4100 0.15 to 0.25 Mo.	0.55
4600 0.20 to 0.30 Mo. 1.50-2.00 Ni.	1.10
5100 0.80-1.10 Cr.	0.45
5100 Cr. spring	0.15
6100 bars	1.20
6100 spring	0.85
Cr. N., Van.	1.50
Carbon Van.	0.85
9200 spring flats	0.15
9200 spring rounds, squares	0.40

Piling

Pittsburgh	2.60c
Chicago, Buffalo	2.70c

Strip and Hoops

(Base, hot-rolled, 25-1 ton)
(Base, cold-rolled, 25-3 tons)

Hot strip to 23/16-in. Pittsburgh	2.40c
Chicago or Gary	2.50c
Birmingham base	2.55c
Detroit, del.	2.61c
Philadelphia, del.	2.70c
New York, del.	2.74c
Cooperage hoop, Pittsburgh	2.50c
Chicago	2.60c
Cold strip, 0.25 carbon and under, Pittsburgh, Cleveland	3.20c
Detroit, del.	3.41c
Worcester, Mass.	3.40c

Carbon	Cleve. Pitts.	Worcester, Mass.
0.26—0.50	3.20c	4.30c
0.51—0.75	4.45c	4.65c
0.76—1.00	6.30c	6.50c
Over 1.00	8.50c	8.70c

Rails, Track Material

(Gross Tons)

Standard rails, mill	$42.50
Relay rails, Pittsburgh 20—100 lbs.	32.50-35.50
Light rails, billet qual., Pittsburgh, Chicago	$43.00
Do., rerolling quality	42.00
Angle bars, billet, Gary, Pittsburgh, So. Chicago	2.80c
Do., axle steel	2.35c
Spikes, R. R. base	3.15c
Track bolts, base	4.35c
Tie plate, base	$46.00

Base, light rails 25 to 60 lbs.; 20 lbs. up $2; 16 lbs. up $4; 12 lbs. up $8; 8 lbs. up $10. Base railroad spikes 200 kegs or more; base plates 20 tons.

Bolts and Nuts

Pittsburgh, Cleveland, Birmingham, Chicago. Discounts to legitimate trade as per Dec. 1, 1932, lists:

Carriage and Machine

½ x 6 and smaller	65-5 off
Do. larger, to 1-in.	60-10 off
Do. 1⅛ and 1¼-in.	60-5 off
Tire bolts	50 off

Plow Bolts

All sizes	65-5 off

Stove Bolts

In packages with nuts attached 70 off; in packages with nuts separate 70-10 off; in bulk 80 off on 15,000 of 3-inch and shorter, or 5000 over 3-inch.

Step bolts	50-10-5 off
Elevator bolts	50-10-5 off

Nuts

S. A. E. semifinished hex.: ½ to 7/8-inch	60-10 off
Do., 9/16 to 1-inch	60-5 off
Do., over 1-inch	60 off

Hexagon Cap Screws

Milled	50-10 off
Upset, 1-in., smaller	60 off

Square Head Set Screws

Upset, 1-in., smaller	75 off
Headless set screws	75 off

Rivets, Wrought Washers

Structural, Pittsburgh, Cleveland	3.60c
Structural, Chicago	3.70c
7/8-inch and smaller, Pitts., Chi., Cleve.	65-5 off

Wrought washers, Pitts., Chi., Phila. to jobbers and large nut, bolt mfrs. l.c.l. $5.40; c.l. $5.75 off

Cut Nails

Cut nails, C. L. Pitts. (10% disc. on all extras)	$3.60
Do., less carloads, 5 kegs or more, no discount on any extras	$3.90
Do., under 5 kegs no disc. on any extras	$4.05

Welded Iron, Steel Pipe

Base discounts on steel pipe, Pitts, Lorain, O., to consumers in carloads. Gary, Ind., 2 points less. Chicago, del. 2½ less. Wrought pipe, Pittsburgh.

Butt Weld

In.	Blk.	Galv.
Steel		
½	59½	49
¾	62½	53
1—3	64½	55½
Iron		
¾	26	8
1—1¼	30	14
1½	34	16½
2	33½	16

Lap Weld

Steel		
2	57	47½
2½—3	60	50½
3½—6	62	52½
7 and 8	61	50½
9 and 10	60½	50
Iron		
2	26½	10
2½—3½	27½	12½
4	29½	16
4½—8	28½	15
9—12	24½	10

Line Pipe

Steel	
1 to 3, butt weld	63½
2, lap weld	56
2½ to 3, lap weld	59
3½ to 6, lap weld	61
7 and 8, lap weld	60
10-inch, lap weld	59½
12-inch, lap weld	58½

Butt Weld

	Blk.	Galv.
Iron		
¾	25	7
1 and 1¼	29	13
1½	33	15½
2	32½	15

Lap Weld

1½	23½	7
2	25½	9
2½ to 3½	26½	11½
4	28½	15
4½ to 8	27½	14
9 to 12	23½	9

Boiler Tubes

Carloads minimum wall seamless steel boiler tubes, cut lengths 4 to 24 feet, f.o.b. Pittsburgh, base price per 100 feet subject to usual extras.

Lap Weld

Sizes	Steel	Charcoal Iron
1½" OD x 13 Ga.	$10.45	$23.71
1¾" OD x 13 Ga.	11.89	22.93
2" OD x 13 Ga.	13.31	19.35
2" OD x 11 Ga.	15.49	23.36
2¼" OD x 13 Ga.	14.82	21.68
2¼" OD x 11 Ga.	17.38	26.02
2½" OD x 12 Ga.	17.82	26.57
2¾" OD x 12 Ga.	18.86	29.00
3" OD x 12 Ga.	19.73	31.36
3½" OD x 11 Ga.	24.89	39.81
4" OD x 10 Ga.	30.81	49.90
5" OD x 9 Ga.	47.57	73.93
6" OD x 7 Ga.	73.25	....

Seamless

	Hot Rolled	Cold Drawn
1" OD x 13 Ga.	$ 8.41	$ 9.46
1¼" OD x 13 Ga.	9.96	11.21
1½" OD x 13 Ga.	11.00	12.38
1¾" OD x 13 Ga.	12.51	14.09
2"OD x 13 Ga.	14.02	15.78
2¼" OD x 13 Ga.	15.63	17.60
2¼" OD x 12 Ga.	17.21	19.37
2½" OD x 12 Ga.	18.85	21.22
2¾" OD x 12 Ga.	19.98	22.49
3" OD x 12 Ga.	20.97	23.60
4½" OD x 10 Ga.	40.15	45.19
3½" OD x 11 Ga.	26.47	29.79
4" OD x 10 Ga.	32.83	36.94
5" OD x 9 Ga.	50.38	56.71
6" OD x 7 Ga.	77.35	87.07

Cast Iron Water Pipe

Class B Pipe—Per Net Ton

6-in. & over, Birm.	$46.00-47.00
4-in., Birmingham	49.00-50.00
4-in., Chicago	57.20-58.20
6 to 24-in., Chicago	54.20-55.20
6-in. & over, east fdy.	50.00
Do., 4-in.	53.00

Class A Pipe $3 over Class B
Stnd. fitgs., Birm., base $100.00

Semifinished Steel

Billets and Blooms

4 x 4-inch base; gross ton

Pitts., Chi., Cleve., Buffalo, Young., Birm.	$37.00
Philadelphia	42.30
Duluth	39.00

Forging Billets

6 x 6 to 9 x 9-in., base

Pitts., Chicago, Buffalo	43.00
Forging, Duluth	45.00

Sheet Bars

Pitts., Cleve., Young Sparrows Point	37.00

Slabs

Pitts., Chicago, Cleveland, Youngstown	37.00

Wire Rods

Pitts., Cleve., No. 5 to 9/32-inch incl.	47.00
Do., over 9/32 to 17/64-inch incl.	52.00

Chicago up $1; Worcester up $2.

Skelp

Pitts., Chi., Young., Buff., Coatesville, Sparrows Pt.	2.10c

Coke

Price Per Net Ton

Beehive Ovens

Connellsville, fur.	$4.00- 4.50
Connellsville, fdry.	5.00- 5.50
Connell. prem. fdry	5.75- 6.25
New River fdry.	6.50- 6.75
Wise county fdry.	5.75- 6.00
Wise county fur.	4.75- 5.00

By-Product Foundry

Newark, N. J., del.	10.88-11.35
Chi., ov., outside del.	10.25
Chicago, del.	11.00
Milwaukee, ovens	11.00
New England, del.	12.50
St. Louis, del.	11.00-11.50
Birmingham, ovens	7.50
Indianapolis, del.	10.50
Cincinnati, del.	10.50
Cleveland, del.	11.05
Buffalo, del.	10.50
Detroit, del.	11.10
Philadelphia, del.	10.63

Coke By-Products

Spot, gal. Producers' Plants

Pure and 90% benzol	16.00c
Toluol	30.00c
Solvent naphtha	30.00c
Industrial xylol	30.00c

Per lb. f.o.b. Frankford and St. Louis

Phenol (200 lb. drums)	16.25c
do. (450 lbs.)	15.25c

Eastern Plants, per lb.

Naphthalene flakes and balls, in bbls. to jobbers	7.25c
Per ton, bulk, f.o.b. oven or port	
Sulphate of ammonia	$29.50

Pig Iron

Delivered prices include switching charges only as noted. No. 2 foundry is 1.75-2.25 sil.; 25c diff. for each 0.25 sil. above 2.25 sil.; 50c diff. below 1.75 sil. Gross tons.

Basing Points:	No. 2 Fdry.	Malleable	Basic	Bessemer
Bethlehem, Pa.	$25.00	$25.50	$23.50	$26.00
Birdsboro, Pa.	25.00	25.50	24.50	26.00
Birmingham, Ala.‡	20.38	.....	19.38	25.00
Buffalo	24.00	24.50	23.00	25.00
Chicago	24.00	24.00	23.50	24.50
Cleveland	24.00	24.00	23.50	24.50
Detroit	24.00	24.00	23.50	24.50
Duluth	24.50	24.50	.....	25.00
Erie, Pa.	24.00	24.50	23.50	25.00
Everett, Mass.	25.75	26.25	25.25	26.75
Granite City, Ill.	24.00	24.00	23.50	24.50
Hamilton, O.	24.00	24.00	23.50	.....
Neville Island, Pa.	24.00	24.00	23.50	24.50
Provo, Utah	22.00	.....	.....	.....
Sharpsville, Pa.	24.00	24.00	23.50	24.50
Sparrow's Point, Md.	25.00	.....	24.50	.....
Swedeland, Pa.	25.00	25.50	24.50	26.00
Toledo, O.	24.00	24.00	23.50	24.50
Youngstown, O.	24.00	24.00	23.50	24.50

‡Subject to 38 cents deduction for 0.70 per cent phosphorus or higher.

Delivered from Basing Points:				
Akron, O., from Cleveland	25.39	25.39	24.89	25.89
Baltimore from Birmingham	25.78	.....	24.66	.....
Boston from Birmingham	26.57	.....	26.07	.....
Boston from Everett, Mass.	26.30	26.80	25.80	27.30
Boston from Buffalo	26.45	26.95	25.95	27.45
Brooklyn, N. Y., from Bethelehem	27.47	27.97	.....	.....
Brooklyn, N. Y., from Bmghm.	27.25	.....	.....	.....
Canton, O., from Cleveland	25.39	25.39	24.89	25.89
Chicago from Birmingham	24.42	.....	23.30	.....
Cincinnati from Hamilton, O.	24.27	25.11	24.61	.....
Cincinnati from Birmingham	23.89	.....	22.89	.....
Cleveland from Birmingham	24.32	.....	23.82	.....
Mansfield, O., from Toledo, O.	25.94	25.94	25.44	25.44
Milwaukee from Chicago	25.10	25.10	24.60	25.10
Muskegon, Mich., from Chicago, Toledo or Detroit	27.10	27.10	26.60	27.60
Newark, N. J., from Birmingham	26.21	.....	.....	.....
Newark, N. J., from Bethlehem	26.53	27.03	.....	.....
Philadelphia from Birmingham	25.58	.....	25.46	.....
Philadelphia from Swedeland, Pa.	25.84	26.34	25.34	.....
Pittsburgh district from Neville Island	Neville, base plus 63c, 76c, and $1.13 switch'g charges			
Saginaw, Mich., from Detroit	26.45	26.45	25.95	25.95
St. Louis, northern	24.55	24.55	24.05	.....
St. Louis from Birmingham	†24.12	.....	23.82	.....
St. Paul from Duluth	26.08	26.08	.....	26.58

†Over 0.70 phos.

Low Phos.

Basing Points: Birdsboro and Steelton, Pa., and Standish, N. Y., $28.50, Phil. base, standard and copper bearing, $29.63.

Gray Forge

Valley furnace $23.50
Pitts. dist. fur. 23.50

Charcoal

Lake Superior fur. $27.00
do., del. Chicago 30.24
Lyles, Tenn. 26.50

Silvery†

Jackson county, O., base: 6-6.50 per cent $28.50; 6.51-7—$29.00; 7-7.50—$29.50; 7.51-8—$30.00; 8-8.50—$30.50; 8.51-9—$31.00; 9-9.50—$31.50; Buffalo $1.25 higher.

Bessemer Ferrosilicon†

Jackson county, O., base: Prices are the same as for silveries, plus $1 a ton.

†The lower all-rail delivered price from Jackson, O., or Buffalo is quoted with freight allowed.

Manganese differentials in silvery iron and ferrosilicon, 2 to 3%, $1 per ton add. Each unit over 3%, add $1 per ton.

Refractories

Per 1000 f.o.b. Works, Net Prices

Fire Clay Brick

Super Quality

Pa., Mo., Ky. $64.60

First Quality

Pa., Ill., Md., Mo., Ky. ... 51.30
Alabama, Georgia 51.30
New Jersey 56.00

Second Quality

Pa., Ill., Ky., Md., Mo. ... 46.55
Georgia, Alabama 41.80
New Jersey 51.00

Ohio

First quality 43.70
Intermediate 39.90
Second quality 35.15

Malleable Bung Brick

All bases $59.85

Silica Brick

Pennsylvania $51.30
Joliet, E. Chicago 59.85
Birmingham, Ala. 51.30

Ladle Brick

(Pa., O., W. Va., Mo.)

Dry press $30.00
Wire cut $28.00

Magnesite

Imported dead - burned grains, net ton f.o.b. Chester, Pa., and Baltimore bases (bags) .. $45.00
Domestic dead - burned grains, net ton f.o.b. Chester, Pa., and Baltimore bases (bags) .. 43.00

Base Brick

Net ton, f.o.b. Baltimore, Plymouth Meeting, Chester, Pa.

Chrome brick $49.00
Chem. bonded chrome ... 49.00
Magnesite brick 69.00
Chem. bonded magnesite 59.00

Fluorspar, 85-5

Washed gravel, duty paid, tide, net ton $23.50-24.00
Washed gravel, f.o.b. Ill., Ky., net ton, carloads, all rail $20.00
Do., for barge $22.00
No. 2 lump 22.00-23.00

Ferroalloys

Dollars, except Ferrochrome

Ferromanganese, 78-82%, tidewater, duty pd. $102.50
Do., Baltimore, base .. 102.50
Do., del. Pittsburgh ... 107.49
Spiegeleisen, 19-21% dom. Palmerton, Pa., spot .. 33.00
Do., New Orleans 33.00
Do., 26-28%, Palmerton 39.00
Ferrosilicon, 50% freight allowed, c.l. 69.50
Do., ton lot 80.50
Do., 75 per cent 126.00
Spot, $5 a ton higher.
Silicoman., 2½ carbon .. 106.50
2% carbon 111.50; 1%, 121.50
Ferrochrome, 66-70 chromium, 4-6 carbon, cts. lb. del. 10.50
Ferrotungsten, stand., lb. con. del. cars 1.95-2.00
Ferrovanadium, 35 to 40% lb., cont. 2.70-2.90
Ferrotitanium, c. l., prod-plant, frt. all., net ton 142.50
Contract, ton lots 145.00
Spot, ton lots 150.00
Ferrophosphorus, per ton, c.l., 17-18% Rockdale, Tenn., basis, 18%, $3 unitage 58.50
Ferrophosphorus, electrolytic, per ton c. l., 23-26% f.o.b. Monsanto, Tenn., 24% $3 unitage 75.00
Ferromolybdenum, stand. 55-65%, lb. f.o.b. mill 0.95
Molybdate, lb. cont. f.o.b. mill 0.80
Technical molybdenum trioxide, 53 to 60% molybdenum, f.o.b. mill .. 0.80

†Carloads. Quan. diff. apply.

Nonferrous

METAL PRICES OF THE WEEK

Spot unless otherwise specified. Cents per pound

	Copper: Electro, del. Conn.	Copper: Lake, del. Midwest	Copper: Casting, refinery	Straits Tin, New York: Spot	Straits Tin, New York: Futures	Lead N. Y.	Lead East St. L.	Zinc St. L.	Aluminum 99%	Antimony American Spot, N. Y.	Nickel Cathodes
Feb. 19	10.00	10.12½	9.52½	42.75	43.00	4.50	4.35	4.75	20.00	13.75	35.00
Feb. 21	10.00	10.12½	9.52½	41.87½	42.20	4.50	4.35	4.75	20.00	13.75	35.00
Feb. 22—Holiday.											
Feb. 23	10.00	10.12½	9.52½	42.87½	43.12½	4.50	4.35	4.75	20.00	13.75	35.00
Feb. 24	10.00	10.12½	9.52½	42.25	42.50	4.50	4.35	4.75	20.00	13.75	35.00
Feb. 25	10.00	10.12½	9.52½	42.25	42.50	4.50	4.35	4.75	20.00	13.75	35.00

MILL PRODUCTS

F.o.b. mill base, cents per lb. except as specified. Copper brass products based on 10.00c *Conn. copper*

Sheets

Yellow brass (high) 16.62½
Copper, hot rolled 18.12½
Lead, cut to jobbers 7.75
Zinc, 100-lb. base 10.00

Tubes

High, yellow brass 19.37½
Seamless copper 18.62½

Rods

High yellow brass 12.62½
Copper, hot rolled 14.62½

Anodes

Copper, untrimmed 15.37½

Wire

Yellow brass (high) 16.87½

OLD METALS

Nom. Del. buying prices

No. 1 Composition Red Brass

*New York 5.95-6.10
*Cleveland 6.50-6.75
Chicago 5.50-5.75
*St. Louis 5.12½-5.37½

Heavy Copper and Wire

*New York, No. 1 .... 7.00-7.12½
Cleveland, No. 1 ..... 7.25-7.50
Chicago, No. 1 ..... 7.12½-7.37½
St. Louis 7.00-7.25

Composition Brass Borings

*New York 4.95-5.10

Light Copper

*New York 5.00-5.12½
Cleveland 5.50-5.75
Chicago 5.25-5.50
St. Louis 5.00-5.25

Light Brass

Cleveland 3.50-3.75
Chicago 3.50-3.75
St. Louis 3.25-3.75

Lead

*New York 3.50-3.75
*Cleveland 3.00-3.25
Chicago 3.00-3.25
St. Louis 3.25-3.50

Zinc

New York 2.12½-2.25
*Cleveland 1.75-2.00
St. Louis 2.12½-2.37½

Aluminum

Borings, Cleveland 5.75-6.00
*Mixed cast, Cleve. 8.75-9.00
*Clips, soft, Cleve. 12.25-13.00
Mixed cast, St. L. 9.75-10.00

SECONDARY METALS

Brass, ingot, 85-5-5-5, lcl .. 10.25
*Stand. No. 12 alum. 16.00-16.50

WAREHOUSE STEEL PRICES

Base Prices in Cents Per Pound, Delivered Locally, Subject to Prevailing Differentials

	Soft Bars	Bands	Hoops	Plates ¼-In. & Over	Structural Shapes	Floor Plates	Sheets: Hot Rolled No. 10	Sheets: Hot Roll Ann. No. 24	Sheets: Galv. No. 24
Boston	4.20c	4.40c	5.40c	4.08c	4.07c	5.73c	4.15c	4.90c	5.10c
New York (Metropolitan)	4.12	4.32	4.32	4.00	3.97	5.60	4.07	4.50	5.00
Philadelphia	4.00	4.10	4.35	3.90	3.90	5.25	4.00	4.65	4.90
Baltimore	4.00	4.20	4.45	3.90	3.90	5.50	3.95	4.50	4.70
Norfolk, Va.	4.15	4.35	4.60	4.05	4.05	5.65	4.10	4.70	5.35
Buffalo	3.90	4.22	4.22	3.92	3.80	5.52	3.97	4.80	5.35
Pittsburgh	3.80	4.00	4.00	3.70	3.70	5.30	3.75	4.50	5.15
Cleveland	3.75	4.16	4.16	3.86	3.86	5.46	3.91	4.66	5.31
Detroit	3.935	4.185	4.185	3.95	3.95	5.55	3.935	4.685	5.40
Cincinnati	4.05	4.25	4.25	3.95	3.95	5.55	4.00	4.75	5.40
Chicago	3.85	4.10	4.10	3.75	3.75	5.35	3.85	4.60	5.25
Minneapolis	4.10	4.35	4.35	4.00	4.00	5.60	4.10	4.75	5.25
Milwaukee	3.96	4.21	4.21	3.86	3.86	5.46	3.96	4.71	5.36
St. Louis	4.09	4.34	4.34	3.99	3.99	5.59	4.09	4.84	5.49
Kansas City	4.34	4.59	4.59	4.24	4.24	5.84	4.10	4.85	5.50
Memphis	4.31	4.51	4.51	4.21	4.21	5.85	4.26	5.01	5.66
Chattanooga	4.21	4.41	4.41	4.11	4.11	5.91	4.16	4.06	4.66
Tulsa, Okla.	4.79	5.04	5.04	4.69	4.69	6.29	4.79	5.54	6.19
Birmingham, Ala.	3.85	4.05	4.05	3.75	3.75	5.96	3.80	4.55	5.20
New Orleans	4.10	4.65	4.65	4.00	4.00	5.95	4.25	4.75	5.15
Houston, Tex.	3.75	6.00	6.40	3.95	3.95	6.00	4.50	5.25	5.65
Seattle	4.45	4.95	6.30	4.25	4.25	6.00	4.50	5.35	5.90
Portland, Oreg.	4.00	4.50	6.50	4.00	4.25	5.70	4.20	5.15	5.90
Los Angeles	4.30	4.80	6.55	4.30	4.30	4.30	4.50	5.00	5.25
San Francisco	4.20	4.80	6.50	4.05	4.05	5.55	4.30	5.15	5.85

	Cold Rolled Strip	Cold Finished Bars	SAE Hot-rolled Bars (Unannealed): 1035-1050	2300 Series	3100 Series	4100 Series	6100 Series	SAE Cold Drawn Bars: 2300	3100
Boston	3.845c	4.65c	4.50c	7.97c	6.52c	6.27c	8.37c	8.97c	7.52c
New York	3.92	4.57	4.32	7.82	6.37	6.12	....	9.00	7.55
Philadelphia	3.88	4.53	4.25	....	....	....	....	....	....
Baltimore	....	4.50	4.15	....	....	....	....	....	....
Norfolk, Va.	....	4.60	....	....	....	....	....	....	....
Buffalo	3.79	4.35	4.10	7.60	6.15	5.90	8.00	8.60	8.15
Pittsburgh	....	4.15	3.95	7.70	6.25	8.50	9.10	8.70	7.25
Cleveland	3.60	4.30	3.95	7.78	6.33	6.33	8.18	8.60	7.15
Detroit	3.78	4.30	4.085	7.89	6.44	6.19	7.74	8.88	7.43
Cincinnati	....	4.50	4.07	7.91	6.46	6.21	9.31	8.92	7.47
Chicago	3.87	4.30	4.05	7.60	6.15	5.90	8.00	8.60	7.15
Minneapolis	....	4.77	4.25	7.95	6.50	8.97	9.57	9.17	7.72
Milwaukee	....	4.41	4.16	7.81	6.36	6.11	8.21	8.81	7.36
St. Louis	3.96	4.54	4.29	7.94	6.49	6.24	8.34	8.94	7.49
Kansas City	4.37	4.79	....	....	....	....	....	....	....
Memphis	....	4.80	....	....	....	....	....	....	....
Chattanooga	....	4.86	....	....	....	....	....	....	....
Tulsa, Okla.	....	5.24	....	....	....	....	....	....	....
New Orleans	5.00	5.10	....	....	....	....	....	....	....
Seattle	....	5.85	6.05	....	8.00	8.00	8.65	....	....
Portland, Oreg.	....	5.85	5.85	9.00	8.00	7.85	8.70	....	....
Los Angeles	5.96	6.85	4.65	9.40	8.55	8.40	9.05	10.40	9.55
San Francisco	9.30	6.80	5.20	9.65	8.80	8.65	9.30	10.65	9.80

CURRENT IRON AND STEEL PRICES OF EUROPE

Dollars at Rates of Exchange, Feb. 24

Export Prices f. o. b. Port of Dispatch—

By Cable or Radio

	British gross tons U. K. ports £ s d	Continental Channel or North Sea ports, metric tons: Quoted in dollars at current value	**Quoted in gold pounds sterling £ s d
Foundry, 2.50-3.00 Si.	$30.18 6 0 0	$18 41	2 6 0
Basic bessemer	....	17.82	2 4 6
Hematite, Phos. .03-.05	32.63 6 10 0	.....	.....
Billets	$39.61 7 17 6	$43.01	5 7 6
Wire rods, No. 5 gage	56.71 11 5 6	42.00	5 5 0
Standard rails	$50.93 10 2 6	$46.00	5 15 0
Merchant bars	2.64c 11 15 0	1.81c	5 0 0
Structural shapes	2.39c 10 12 6	1.76c	4 17 6
Plates, †¼ in. or 5 mm.	2.60c 11 11 3	2.22c	6 2 6
Sheets, black, 24 gage or 0.5 mm.	3.15c 14 0 0	2.81c	7 15 0°
Sheets, gal., 24 ga., corr.	3.77c 16 15 0	3.44c	9 10 0
Bands and strips	2.98c 13 5 0	1.91c to 1.99c	5 5 0 to 5 10 0
Plain wire, base	4.39c 19 10 0	2.22c to 2.63c	6 2 6 to 7 5 0
Galvanized wire, base	5.23c 23 5 0	2.84c to 2.94c	7 17 6 to 8 2 6
Wire nails, base	4.16c 18 10 0	2.53c to 2.71c	7 0 0 to 7 10 0
Tin plate, box 108 lbs.	$5.66 1 2 6	....	....

British ferromanganese $102.50 delivered Atlantic seaboard, duty-paid

Domestic Prices at Works or Furnace—

Last Reported

	£ s d	French Francs	Belgian Francs	Reich Marks
Fdy. pig iron, Si. 2.5	$27.41 5 9 0(a)	$18.53 563½	$24.65 725	$25.48 63
Basic bess. pig iron	25.15 5 0 0(a)	....	....	28.11(b) 69.50
Furnace coke	8.16 1 12 6	6.22 189	7.31 215	7.69 19
Billets	39.71 7 17 6	27.63 840	32.64 960	39.03 96.50
Standard rails	2.28c 10 2 6	1.73c 1,150	2.06c 1,375	2.38c 132
Merchant bars	2.58c 11 9 0	1.62c 1,080	1.65c 1,100	1.98c 110
Structural shapes	2.48c 11 0 6	1.58c 1,055	1.65c 1,100	1.93c 107
Plates, †¼-in. or 5 mm.	2.64c 11 14 3	2.03c 1,350	2.06c 1,375	2.29c 127
Sheets, black	3.53c 15 15 0§	2.35c 1,565‡	2.36c 1,575‡	2.59c 144‡
Sheets, galv., corr., 24 ga. or 0.5 mm.	4.16c 18 10 0	3.38c 2,250	4.50c 3,000	6.66c 370
Plain wire	4.39c 19 10 0	2.49c 1,660	2.48c 1,650	3.11c 173
Bands and strips	2.75c 12 4 0	1.82c 1,210	2.32c 1,550	2.29c 127

*Basic. †British ship-plates. Continental, bridge plates. §24 ga. ‡1 to 3 mm. basic price. British quotations are for basic open-hearth steel. Continent usually for basic-bessemer steel. (a) del. Middlesbrough. (b) hematite. °Close annealed.

**Gold pound sterling carries a premium of 64.4 per cent over paper sterling.

—The Market Week—

IRON AND STEEL SCRAP PRICES

Corrected to Friday night. Gross tons delivered to consumers, except where otherwise stated; † indicates brokers prices

HEAVY MELTING STEEL

Birmingham, No. 1	10.00
Birmingham, No. 2	9.00
Bos. dock No. 1 exp.	14.00
N. Eng. del. No. 1	13.50
Buffalo, No. 1	12.50-13.00
Buffalo, No. 2	10.50-11.00
Chicago, No. 1	11.50-12.00
Cleveland, No. 1	12.50-13.00
Cleveland, No. 2	11.50-12.00
Detroit, No. 1	9.50-10.00
Eastern Pa., No. 1	14.50
Eastern Pa., No. 2	12.50-13.00
Federal, Ill.	10.75-11.25
Granite City, R. R.	11.75-12.25
Granite City, No. 2	10.75-11.25
Los Angeles, No. 1	15.00-17.50
Los Angeles, No. 2	13.50-16.00
New York, No. 1	†11.00
N. Y. dock No. 1 exp.	13.50
Pitts., No. 1 (R. R.)	15.50-16.00
Pitts., No. 1 (dlr.)	13.50-14.00
Pittsburgh, No. 2	13.00-13.50
St. Louis, R. R.	11.75-12.25
St. Louis, No. 2	10.75-11.25
San Francisco, No. 1	14.00-15.00
Seattle, No. 1	8.00
Toronto, dlrs. No. 1	10.00
Valleys, No. 1	13.50-14.00

COMPRESSED SHEETS

Buffalo, dealers	10.50-12.00
Chicago, factory	10.50-11.00
Chicago, dealer	9.50-10.00
Cleveland	12.00-12.50
Detroit	10.25-10.75
E. Pa., new mat.	14.50
E. Pa., old mat.	9.50-10.00
Los Angeles	13.00-16.00
Pittsburgh	14.00-14.50
St. Louis	6.75- 7.25
Valleys	12.50-13.00

BUNDLED SHEETS

Buffalo	11.50
Cincinnati, del.	9.00- 9.50
Cleveland	9.00- 9.50
Los Angeles	11.50-14.50
Pittsburgh	13.00-13.50
St. Louis	6.00- 6.50
Toronto, dealers	7.00

SHEET CLIPPINGS, LOOSE

Chicago	7.00- 7.50
Cincinnati	5.50- 6.00
Detroit	7.00- 7.50
† Los Angeles	4.00
St. Louis	5.00- 5.50

STEEL RAILS, SHORT

Birmingham	15.00
Buffalo	17.50-18.00
Chicago (3 ft.)	15.50-16.00
Chicago (2 ft.)	16.00-16.50
Cincinnati, del.	17.00-17.50
Detroit	14.50-15.00
Los Angeles	18.00-22.00
Pitts, 3 ft. and less	17.75-18.25
St. Louis, 2 ft. & less	15.00-15.50

STEEL RAILS, SCRAP

Boston district	†11.00
Buffalo	15.50-16.00
Chicago	11.50-12.00
Cleveland	16.50-17.00
Pittsburgh	15.75-16.25
St. Louis	12.00-12.50
Seattle	10.00

STOVE PLATE

Birmingham	8.00- 8.50
Boston, district	†8.25- 8.50
Buffalo	10.50-11.00
Chicago, net	8.50- 9.00
Cincinnati, dealers	5.50- 6.00
Detroit, net	8.50- 9.00
Eastern Pa.	12.50-13.00
New York, fdry.	†8.50- 9.00
St. Louis	8.00- 8.50
Toronto, deal'rs, net	9.00

SPRINGS

Buffalo	16.00-16.50
Chicago, coil	16.50-17.00
Chicago, leaf	15.00-15.50
Eastern Pa.	17.00-17.50
Pittsburgh	17.75-18.00
St. Louis	14.00-14.50

ANGLE BARS—STEEL

Chicago	14.00-14.50
St. Louis	13.00-13.50

RAILROAD SPECIALTIES

Chicago	14.00-14.50

LOW PHOSPHORUS

Buffalo, crops	17.00-17.50
Cleveland, crops	19.50-20.50
Eastern Pa., crops	18.50-19.00
Pittsburgh, crops	17.50-18.00

FROGS, SWITCHES

Chicago	12.00-12.50
St. Louis, cut	12.00-12.50

SHOVELING STEEL

Federal, Ill.	10.75-11.25
Granite City, Ill.	10.75-11.25
Los Angeles (net)	16.00-18.00
Toronto, dealers	8.00

RAILROAD WROUGHT

Birmingham	11.00-11.50
Boston district	†9.00- 9.50
Chicago, No. 1 net	9.50-10.00
Cincinnati, No. 2	9.50-10.00
Eastern Pa., No. 1	15.50-16.00
St. Louis, No. 1	8.50- 9.00
St. Louis, No. 2	11.75-12.25
Toronto, No. 1 dlr.	16.00

SPECIFICATION PIPE

Eastern Pa.	14.00-14.50
New York	†9.00- 9.50

BUSHELING

Buffalo, No. 1	10.50-11.00
Chicago, No. 1	10.50-11.00
Cincin., No. 1, deal.	8.50- 9.00
Cincinnati, No. 2	3.00- 3.50
Cleveland, No. 2	8.50- 9.00
Detroit, No. 1, new	9.50-10.00
Valleys, new, No. 1	12.50-13.00
Toronto, dealers	7.00

MACHINE TURNINGS

Birmingham	6.00- 7.00
Buffalo	6.25- 6.75
Chicago	6.00- 6.50
Cincinnati, dealers	4.00- 4.50
Cleveland	7.50- 8.00
Detroit	5.25- 5.75
Eastern Pa.	7.00- 7.50
Los Angeles	4.00- 8.00
New York	†4.50
Pittsburgh	8.00- 8.50
St. Louis	4.50- 5.00
Toronto, dealers	7.00
Valleys	9.50-10.00

BORINGS AND TURNINGS

For Blast Furnace Use

Boston district	†2.50
Buffalo	6.50- 7.00
Cincinnati, dealers	3.50- 4.00
Cleveland	9.00- 9.50
Detroit	6.00- 6.50
Eastern Pa.	6.50- 7.00
New York	†4.50- 5.00
Pittsburgh	7.00- 7.50
Toronto, dealers	7.50

CAST IRON BORINGS

Birmingham	6.00- 7.00
Boston dist. chem.	†7.50- 8.00
Bos. dist. for mills	†7.00- 7.50
Buffalo	6.50- 7.00
Chicago	5.50- 6.00
Cincinnati, dealers	3.50- 4.00
Cleveland	9.00- 9.50
Detroit	6.00- 6.50
E. Pa., chemical	12.00-13.00
New York	†4.50- 5.00
St. Louis	5.00- 5.50
Toronto, dealers	7.50

PIPE AND FLUES

Cincinnati, dealers	7.00- 7.50
Chicago, net	7.50- 8.00

RAILROAD GRATE BARS

Buffalo	9.00- 9.50
Chicago, net	8.50- 9.00
Cincinnati	5.50- 6.00
Eastern Pa.	12.50-13.00
New York	†8.50- 9.00
St. Louis	9.00- 9.50

FORGE FLASHINGS

Boston district	†7.00
Buffalo	10.50-11.00
Cleveland	11.00- 11.50
Detroit	9.00- 9.50
Los Angeles	9.00
Pittsburgh	12.75-13.25

FORGE SCRAP

Boston district	†6.50
Chicago, heavy	15.00-15.50

ARCH BARS, TRANSOMS

St. Louis	14.00-14.50

AXLE TURNINGS

Boston district	†7.50
Buffalo	12.00-12.50
Chicago, elec. fur.	11.50-12.00
Eastern Pa.	14.00-14.50
St. Louis	8.00- 8.50
Toronto	8.00

STEEL CAR AXLES

Birmingham	16.00-17.00
Buffalo	16.00-16.50
Boston district	†14.00
Chicago, net	17.00-17.50
Eastern Pa.	21.50-22.00
St. Louis	17.50-18.00

SHAFTING

Boston district	†14.00
New York	†15.50-16.00
Eastern Pa.	19.00-19.50
St. Louis	13.00-13.50

CAR WHEELS

Birmingham	14.00-15.00
Boston dist., iron	†10.00
Buffalo, steel	16.00-16.50
Chicago, iron	14.00-14.50
Chicago, rolled steel	14.50-15.00
Cincinnati, iron	15.00-15.50
Eastern Pa., iron	15.50
Eastern Pa., steel	17.00-17.50
Pittsburgh, iron	15.00-15.50
Pittsburgh, steel	17.75-18.25
St. Louis, iron	12.00-12.50
St. Louis, steel	14.50-15.00

NO. 1 CAST SCRAP

Birmingham	14.00-14.50
Boston, No. 1 mach.	†11.00
N. Eng. del. No. 2	12.00
N. Eng. del. textile	15.00-15.50
Buffalo, cupola	13.50-14.00
Buffalo, mach.	15.00-15.50
Chicago, agri. net	10.50-11.00
Chicago, auto	11.50-12.00
Chicago, railr'd net	10.50-11.00
Chicago, mach. net	11.50-12.00
Cincin., mach. cup.	11.00-11.50
Cleveland, mach.	17.00-17.50
Eastern Pa., cupola	16.00
E. Pa., mixed yard	14.00
Los Angeles	13.00-14.00
Pittsburgh cupola	16.00-16.50
San Francisco, del.	13.50-14.00
Seattle	8.00
St. Louis, No. 1	10.00-10.50
St. L., No. 1, mach.	11.00-11.50
Toronto, No. 1, mach., net	12.50

HEAVY CAST

Boston dist. break.	†9.00- 9.50
N. Eng., del.	11.50-12.00
Buffalo, break	11.00-11.50
Cleveland, break.	14.50-15.50
Detroit, break.	10.00-10.50
Detroit, auto net.	12.50-13.00
Eastern Pa.	14.00-14.50
Los Angeles	13.00-14.00
New York, break.	†10.50-11.00
Pittsburgh	12.50-13.00

MALLEABLE

Birmingham, R. R.	12.50-13.50
New England, del.	16.00
Buffalo	13.50-14.00
Chicago, R. R.	14.00-14.50
Cincin., agri. del.	10.50-11.00
Cleveland, rail	15.50-16.00
Detroit, auto	11.50-12.00
Eastern Pa., R. R.	16.50-17.50
Los Angeles	13.00-14.00
Pittsburgh, rail	14.25-14.75
St. Louis, R. R.	13.00-13.50

RAILS FOR ROLLING

5 feet and over

Birmingham	16.00-17.00
Boston	†12.00
Chicago	15.00-15.50
Eastern Pa.	18.00-18.50
New York	†15.00-15.50
St. Louis	13.50-14.00

LOCOMOTIVE TIRES

Chicago (cut)	14.50-15.00
St. Louis, No. 1	13.75-14.25

LOW PHOS. PUNCHINGS

Buffalo	16.00-16.50
Chicago	14.00-14.50
Eastern Pa.	18.00-19.00
Pittsburgh (heavy)	17.50-18.00
Pittsburgh (light)	17.00-17.50
Seattle	15.00

Iron Ore

Lake Superior Ore

Gross ton, 51½ % Lower Lake Ports

Old range bessemer	$5.25
Mesabi nonbess.	4.95
High phosphorus	4.85
Mesabi bessemer	5.10
Old range nonbess.	5.10

Eastern Local Ore

Cents, unit, del. E. Pa.

Foundry and basic 56.63% con.	9.00-10.00
Cop.-free low phos. 58-60%	nominal

Foreign Ore

Cents per unit, f.a.s. Atlantic

Foreign manganiferous ore, 45.55% iron, 6-10% man. nom.	12.00-13.00
No. Afr. low phos.	nominal
Swedish low phos.	17.00-18.00
Spanish No. Africa basic, 50 to 60% nom.	12.00
Tungsten, sh. ton. unit, duty paid nom.	24.50-25.50
N. F., fdy., 55%	7.00
Chrome ore, 48% gross ton, c.i.f.	$25.50-26.50
Moiybdenum ores sulphide, per lb. molybdenum contained, f.o.b. mill	0.75

Manganese Ore

Prices not including duty, cents per unit cargo lots.

Caucasian, 50-52% nom.	45.00
So. African, 50-52% nom.	45.00
Indian, 50-52%	Nominal

—The Market Week—

Sheets

Sheet Prices, Page 78

Pittsburgh — Sheet mills show slightly improved operations, averaging around 30 per cent. This is somewhat better than last week and probably reflects a resumption of buying on the basis established before the drop in cold-finished sheets. Increase in sheet orders as a result of reaffirmation of prices last week has not yet begun, but most producers are confident that it will make itself felt shortly. Adjustments on extras for hot-rolled sheets to align prices on these products with the newly announced cold-rolled sheet prices have been announced.

Cleveland—Producers of hot and cold-rolled sheets have noted little improvement in specifications resulting from the announcement of second quarter prices. Some jobbers are more inclined to buy but the general improvement has not yet appeared. Operations of most consumers are still at substantially reduced schedules.

Chicago — While sheet releases have been slightly heavier since the recent extension of prices, improvement in demand has been somewhat less than that experienced by heavier products. Automotive buying still lags, showing little change from the slow rate of the previous several weeks. Better buying is in prospect for March. Fair business is coming from jobbers.

Boston — Clarification of sheet prices has resulted in some scattered buying of finishes other than cold-reduced, a small volume held up until quotations were definitely announced. Light buying by miscellaneous consumers accounts for most orders, with larger industrial users specifying close to requirements. Slight gain in demand for galvanized is noted by a few sellers.

Readvertised estimates on 150 tons, 24-gage hot-rolled pickled annealed sheets for license tags will be taken by the state of Maine, March 8.

New York—Improvement in sheet buying since the recent general reaffirmation of base prices has come principally from small consumers, who have at practically no time had much in the way of excess stocks. This increase so far has been slight and reflects largely certain scattered orders which had been held up temporarily pending some action with respect to prices. Larger consumers still have fairly substantial stocks, either in the form of raw materials or finished products which they have been unable to move. An exception is refrigerator manufacturers, who

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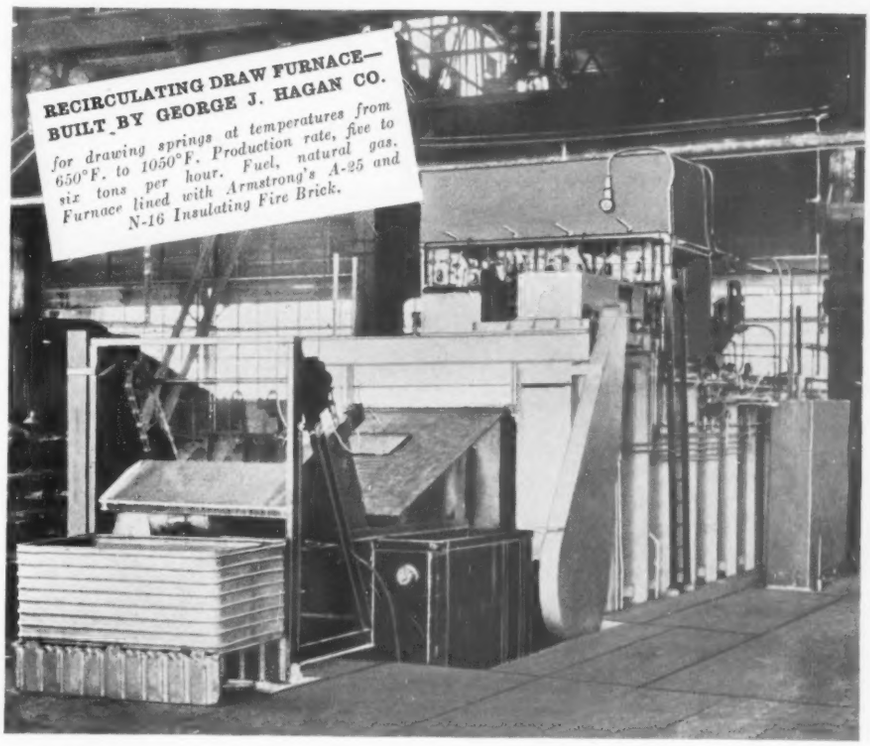
—for increased efficiency and economy


RECIRCULATING DRAW FURNACE—
BUILT BY GEORGE J. HAGAN CO.
for drawing springs at temperatures from 650°F. to 1050°F. Production rate, five to six tons per hour. Fuel, natural gas. Furnace lined with Armstrong's A-25 and N-16 Insulating Fire Brick.

THE George J. Hagan Company of Pittsburgh is one of many prominent furnace builders who use Armstrong's Insulating Fire Brick. In heated equipment of steel plants and other industrial plants throughout the country, these brick have proved their ability to effect substantial fuel savings and help in obtaining more efficient temperature control.

Armstrong's Brick are light in weight with exceptionally low heat capacity. Their use permits thinner furnace walls and consequent larger hearth area. They are available in five sizes for a wide range of temperatures. Armstrong will gladly furnish complete specifications outlining the standards for the different physical characteristics with permissible tolerances. Write today for print showing Armstrong's 105 Flat Arch Construction for roofs and hanging walls. Armstrong Cork Products Company, Building Materials Division, 985 Concord Street, Lancaster, Pa.

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2. High crushing strength
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4. High spalling resistance
5. High salvage value
6. Complete line for wide temperature range
7. Ability to withstand handling in shipping and installing
8. Special shapes of all types and sizes
9. Easily cut on the job
10. Low heat storage and quicker heating
11. Laying cements with same physical characteristics as brick
12. Complete line of refractory facing cements

Armstrong's

HIGH TEMPERATURE INSULATION

INSULATING FIRE BRICK · HIGH TEMPERATURE BLOCK

PLASTIC CEMENTS · DIATOMACEOUS EARTHS

have been specifying rather freely for the past several weeks, although taking far less than their normal requirements at this season.

Philadelphia—Reduction of 5 to 10 cents in pickling extras on hot-rolled and hot-rolled annealed sheets, gages 17 to 27, inclusive, has resulted in somewhat renewed interest in these grades since part of the previous differential with cold-rolled is thus restored. Additional automotive releases have given the sheet market the brightest appearance in weeks. Job stampers are slightly more active on varied work, such as refrigerators and air conditioning work. No pressure on prices is reported following the recent adjustments.

Cincinnati—Reaffirming of prices on sheets for second quarter has served to steady the market, without immediate effect on tonnage. Demand is holding most of the recent gains, attributed partly to better automobile releases. Sales are broad, with a tendency toward seasonal lag in household equipment needs.

St. Louis—No appreciable effect has been felt in the local sheet situation from the reaffirmation of current prices into second quarter. Purchasing continues the gradual expansion of the past several weeks and demands are fairly well diversified. Some improvement is noted in tin plate and this is expected to continue during the next two or three weeks.

Birmingham, Ala. — Sheets continue the slight upward trend evident over the past two weeks, particularly in manufacturers' sheets. Roofing is somewhat sluggish as compared to previous weeks.

Strip

Strip Prices, Page 79

Pittsburgh—Strip operations are holding at the same level as last week, about 20 per cent. No new sources of strip business have developed, and although the automotive situation looks brighter, there is no current increase in buying.

Cleveland — Producers of hot and cold-rolled strip report only moderate improvement in new business following announcement of second quarter prices. Most consumers still have ample stocks to satisfy current requirements. Auto partsmakers are receiving small releases from the Detroit district.

Chicago—Strip orders this month are about on a par with those of the corresponding January period, but a slight gain in orders the past week may result in a small increase for February as a whole. Automotive demand still lags, but is counted on for moderate improvement during March.

Boston—On most cold strip prices are unchanged for second quarter, as relatively little commodity strip is made in New England, on which quotations are $2 a ton lower. Consumption of this grade is also light, only two or three mills being effected. Orders for narrow cold material are slightly more numerous, but small individually and finishing operations are unchanged at 25 to 30 per cent. Shipments by several producers this month have been somewhat above incoming business, releases on some tonnage originally scheduled for March delivery having been advanced. As a result mill backlogs are smaller than ever. Normally large consumers in some instances have heavy inventories of products fabricated of strip to be liquidated.

New York—Orders and releases for cold strip are small, about in line with the recent rate. Reaffirming of prices has not yet resulted in much additional buying. Consumers of commodity strip are few in this territory, although some tubing makers will naturally be benefited by the lower price.

Philadelphia—Narrow strip, both hot and cold-rolled, is a shade more active than two or three weeks ago, although this material has not encountered the improvement shown by other grades. Prices are steady.

Plates

Plate Prices, Page 78

Pittsburgh—Little new movement has been noticed in plates. Possibilities of action on some barge contracts in the near future give indications of new business along this line. Other sources of plate business are still inactive, with no immediate prospects of an upturn.

Cleveland—Sellers of plates note little change in the amount of new orders since renewal of second quarter prices. Some new business has appeared but not to the extent hoped for. The usual spring demand for ship repair work has already been covered and work along this line has progressed steadily. Railroad needs are waiting for the interstate commerce commission decision on freight rates. Structural requirements are light.

Chicago—Plate inquiries and orders are slightly heavier. Better releases are noticeable from railroads, though requirements still are extremely light in the absence of active inquiries for freight cars. No marked increase in plate demand from that direction is in early prospect. More building work is being figured, part of which has yet to reach an active status, but additional plate inquiries have appeared from that direction.

Boston—Plate orders are slightly more active, small lots predominating, with only moderate improvement in tonnage going to mills. While needs will be spread over a long period, shipbuilding continues to be the brightest prospect. Boiler shop buying continues slack with not much work being estimated by tank builders or large-diameter steel pipe fabricators. Warehouses and structural shops are taking in only small shipments.

New York—Plate buying is spotty with little outstanding tonnage being figured. Eastern plate mills lost 1150 tons to Pittsburgh mills for two steel scows recently awarded by Merritt-Chapman & Scott, this city, to the Dravo Corp., Pittsburgh. Export inquiry includes 3000 tons of ship plates from Norway. Japan is also reported to be figuring on a much larger tonnage for Manchukuo, with a portion of this tonnage placed recently.

The water department of New York has awarded 2500 tons of large diameter pipe for installation in Brooklyn to Alco Products Inc. United States maritime commission expects to place shortly four of the 12 cargo vessels on which bids were opened early this month.

Philadelphia—Platemakers note a perceptible improvement in miscellaneous demand. Buying is still on a hand-to-mouth basis although inventories in some directions are reported unusually low. Some excessive inventories are apparent, however, especially in the hands of railroads. Prices for domestic delivery are steady although some deviation was noted on about 1000 tons of plates for various navy yards on which bids were opened Feb. 21. On 211 tons of plates opening Feb. 14 six sellers quoted 2.495c, delivered, Philadelphia, while a seventh quoted 2.445c, a concession of $1.

Atlantic Refining Co., Philadelphia, is in the market for 17 refinery towers for Point Breeze, Pa., part of which specify stainless steel linings.

Birmingham, Ala. — Plates are especially spotty with buying in unusually small lots.

San Francisco—Plate bookings, with one exception, were limited to lots of less than 100 tons. Unnamed interests secured 100 tons for three 250-horsepower boilers for a county institution in Los Angeles county. Bids have been taken on 300 tons of plates and shapes for a freighter for San Francisco bay but no award has yet been made. Bids are ex-

pected to be called for soon for 14,000 feet of 30-inch welded steel pipe for a line in Colorado Springs between the Bell crossing and the high line reservoir. The estimated cost of the work has been set at $80,000.

Seattle — Low bid for Seattle's crosstown pipe line improvement was offered by Puget Sound Machinery Depot, Seattle, at $611,579. Award was made even though bid was above city engineer's estimate of $484,584. The project involves 1600 tons of ½ to 9/16-inch steel plates and 1200 tons of cast iron pipe, 20 inches and smaller. U. S. coast guard, Seattle, has called bids March 8 for construction of two 110-foot steel harbor cutters, diesel electric drive, involving about 200 tons of plates and shapes.

Plate Contracts Placed

1800 tons, 20 to 36-inch welded pipe for watermain, Seattle, to Puget Sound Machinery Depot at $611,579.

1150 tons, two steel scows for Merritt-Chapman & Scott, New York, for construction by Dravo Corp., Pittsburgh, with steel going to mills in that district.

335 tons, pipe liners, Hiwassee dam, N. C., Tennessee valley authority project spec. 165490, to Koppers Co., Pittsburgh.

100 tons, three 250-horsepower boilers, Olive View sanitorium, Los Angeles county, California, to unnamed interest.

Unstated tonnage, nine steel electric welded buoys, 5-foot diameter by 15 feet long, lighthouse bureau, Staten Island, N. Y., to Downingtown Iron Works, Downingtown, Pa., and two riveted gas buoys, 8-foot diameter by 20 feet long, to Biggs Boiler Works Co., Akron, O.; bids Feb. 3.

Unstated tonnage, three pipeline barges for pontoons, each 47 x 18 x 3 feet, United States engineer, Rock Island, Ill., to St. Louis Shipbuilding & Steel Co., St. Louis, welded construction, at $8190.

Plate Contracts Pending

1600 tons, Seattle crosstown extension; Puget Sound Machinery Depot, Seattle, low.

1200 tons, mostly plates, gas holder, Waterbury, Conn.

300 tons, bay freighter, San Francisco; Moore Drydock Co., Oakland, Calif., low.

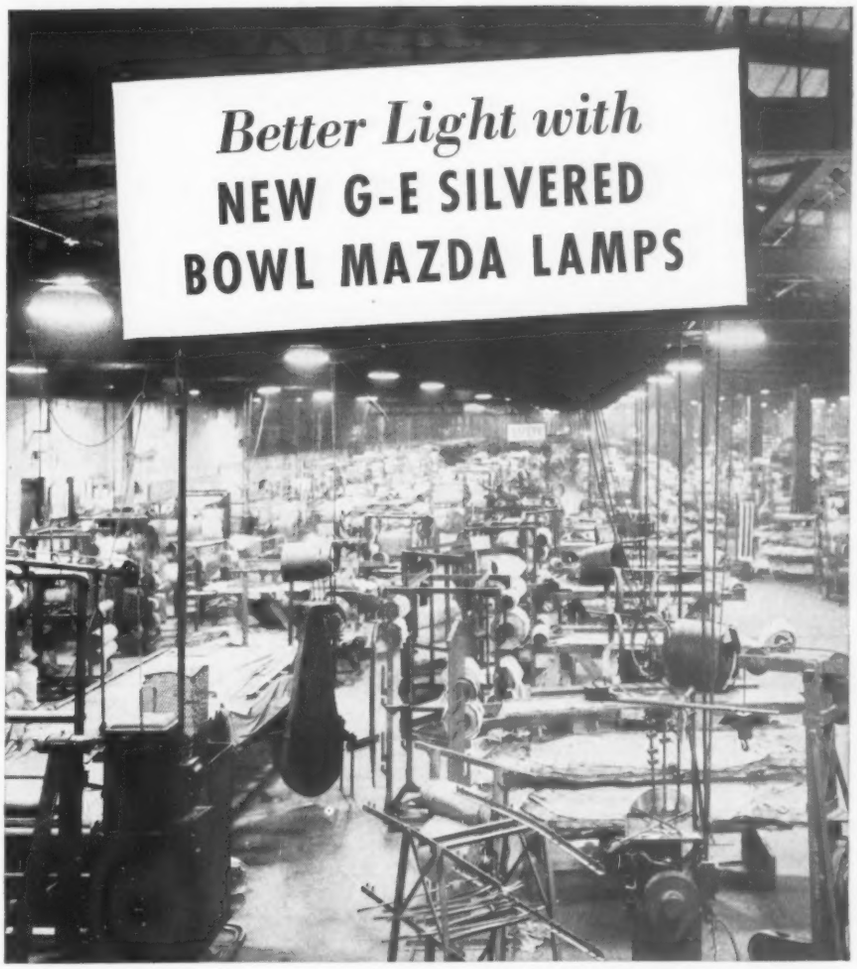
200 tons (including shapes), two 110-foot harbor cutters for coast guard; bids at Seattle, March 8.

Unstated tonnage, 175,000-gallon steel standpipe, Nassau, N. Y.; bids in.

Bars

Bar Prices, Page 78

Pittsburgh—Extended price schedules have not been reflected in buying in the local steel bar market. Sentiment is generally better, however, as sellers on the whole look for a slight improvement. No im-



The tire building department in Dunlop's Buffalo plant showing the main lighting installation with 500-watt G-E Silvered Bowl MAZDA *lamps.*

DUNLOP TIRE AND RUBBER CORP. PLANT STARTS LIGHT CONDITIONING

The Dunlop Tire & Rubber Corporation in Buffalo recently light conditioned its tire building department, using 500-watt G-E Silvered Bowl MAZDA lamps. The new lighting provides four to five times more light than the old system and gives employees the right kind of lighting for Seeing and Comfort . . . wherever eyes are used.

Important to the success of any relighting program is the use of good lamp bulbs . . . such as G-E MAZDA lamps, the kind that *Stay Brighter Longer* and give full lighting value for your money. Next time you buy lamp bulbs, follow the example of thousands of purchasing agents . . . the men who buy bulbs for the outstanding industrial and commercial concerns, great railroad systems, and public utilities . . . and specify G-E MAZDA lamps. General Electric Company, Dept. 166, Nela Park, Cleveland, O.

G-E Silvered Bowl MAZDA *lamps are regular* MAZDA *lamps with a coating of "mirror" silver on the bowl.*

USE A G-E LIGHT METER TO MEASURE PLANT LIGHTING

The General Electric Light Meter measures light as simply as a thermometer measures temperature. It tells whether the various departments in your plant are getting enough light for safe seeing. Order one today. Costs only $11.50.

GENERAL ELECTRIC MAZDA LAMPS

mediate help is seen from railroad sources, although automotive possibilities seem somewhat better. No releases of any importance have been received in the district, however.

Cleveland—Specifications for commercial and alloy steel bars are limited to actual needs. However the volume of new business has shown a moderate increase since prices were extended into second quarter. Stocks in most consumers' yards are still large with operations at two and three-day schedules each week. Farm and road equipment manufacturers continue comparatively busy.

Chicago—A small gain in bar demand has followed announcement of extension of current prices. Automotive releases still are slight, improvement in buying being more noticeable. Some betterment in automotive needs is anticipated next month, however, in view of scheduled expansion in motor car assemblies with the approach of spring. Bar consumption by farm equipment builders is steady, still comparing favorably with a year ago.

Boston — Since reaffirming of prices for second quarter, there has been a slight, but scattered improvement in commercial steel bar specifications. Most business, however, is for immediate needs with little advance covering. Demand is somewhat broader, however, with the recent small, but steady inquiry for alloy bars maintained. There has been a mild but not sustained improvement from screw machine product consumers.

New York — Despite a decline in their bookings, machinery builders continue to be outstanding buyers of bars. At least their activity is in bold contrast with purchases by railroads, bolt and nut manufacturers and jobbers, among other normally leading consuming groups. The recent affirmation of prices for second quarter has improved sentiment, but not sufficiently to account for any real increase in tonnage.

Philadelphia—Consumer requirements for bars display a slight expansion, which is traceable to no one industry and indicates the widely diversified character of current buying. Warehouses are placing some fill-in orders but generally jobber stocks are somewhat above normal. High-speed tungsten tool steel has been reduced to 67 cents per pound from 80 cents.

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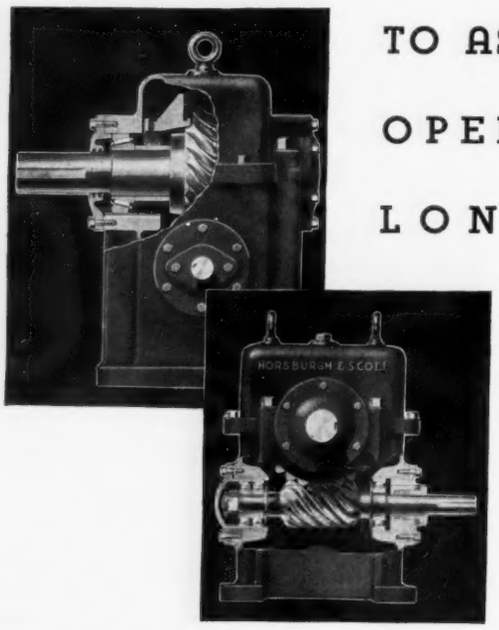

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Pipe

Pipe Prices, Page 79

Pittsburgh — Although no new price announcements have been made on tubular goods, it is understood orders will be taken on the same basis as previously. Operations continue at about the same rate, with little new activity noted. There is still some demand for oil country goods, with other lines comparatively inactive.

Cleveland — Steel pipe requirements out of jobbers' stocks show only moderate improvement over the last 10 days. Industrial needs for expansion programs and repairs are at a minimum, and domestic requirements have failed to show improvement. Cast iron pipe foundries are still on a one or two-day weekly schedule, shipping from stock on most of the miscellaneous tonnage moving. Renewal of second quarter prices is expected to encourage a number of municipalities to go through with plans for improved water distribution systems.

Chicago—While cast iron pipe is seasonally slow, small inquiries are fair and producers are looking forward to a gradual pickup with the

approach of spring. Large lots are lacking among both orders and inquiries following the closing on Milwaukee's recent inquiry for 1800 tons.

Boston—While cast pipe buying is light, there has been considerable blanket covering against current annual needs, a good part of which has gone to the district foundry. Bids are in on several hundred tons of six-inch for relief projects, Haverhill, Mass., and Boston. Merchant steel pipe is not active, adversely influenced by slow building.

New York—Including inquiries for Albany, Rome and Elmira, N. Y., bids are in on approximately 1000 tons of cast pipe with approval asked for the purchase of 1500 tons for New York city yard stocks. A contractor is also closing on several hundred tons for Colchester, Conn. In the main, however, buying is in small fill-in lots with most eastern foundries supplying such deliveries from stock.

Birmingham, Ala. — Southern pipe plants remain on approximately a 40 per cent basis with no outstanding business to report. Quite a few indicative inquiries, however, are evident over the past few days.

San Francisco—Demand for cast iron pipe has improved and the outlook is more encouraging. Outstanding award of the week went to United States Pipe & Foundry Co. and involved 1661 tons of 4 to 20-inch, Class 100 and 150 pipe for Long Beach, Calif. So far this year 4232 tons have been placed, compared with 2720 tons for the same period a year ago. Pending business now exceeds 7000 tons.

Cast Pipe Placed

1661 tons, 4 to 20-inch, Class 100 and 150, Long Beach, Calif., to United States Pipe & Foundry Co., Burlington, N. J.
447 tons, 12-inch and under, including 87 tons of special castings, Albany, N. Y., to United States Pipe & Foundry Co., Burlington, N. J.
250 tons, 6-inch, Haverhill, Mass., to United States Pipe & Foundry Co., Burlington, N. J.
112 tons, 6-inch state procurement officer, treasury department, Boston, to United States Pipe & Foundry Co., Burlington, N. J., at 85 cents a linear foot, delivered; bids Feb. 23.

Steel Pipe Placed

Unstated tonnage, 50 lengths, 60-foot sections, 20-inch electrically welded discharge pipe, U. S. engineer, Louisville, Ky., to American Rolling Mill Co., Middletown, O., $14,367.50; bids Jan. 31, cir. 252.

Cast Pipe Pending

1200 tons, 20-inch and under, Seattle cross-town extension; Puget Sound Machinery Depot, Seattle, low.
928 tons, 4 to 12-inch, Class 150 to 250, East Bay municipal utility district, Oakland, Calif.; bids opened.
911 tons, 6 and 8-inch, Class 250, Los Angeles; bids opened.
690 tons, 4 to 16-inch, Springfield, Mass.; bids March 8.
450 tons, various sizes, and special fittings, Albany, N. Y.; bids in.
450 tons, 6-inch, Shrewsbury, Mass.; bids in.
400 tons, 4 and 6-inch and fittings, King county district No. 3, Seattle; bids March 4.
225 tons, 24-inch, state procurement officer, treasury department, Elmira, N. Y.; bids in.
200 tons, various sizes, Medford, Mass.; bids in.
110 tons, 6-inch, state procurement officer, treasury department, Boston; bids in.
110 tons, 4-inch and fittings, Billings, Mont.; bids in.

Steel Pipe Pending

200 tons, Oak Grove, Oreg., extension; E. P. Slater, Salem, general contractor.

Wire

Wire Prices, Page 79

Pittsburgh—Production of manufacturers' wire is tapering slightly with the finishing of spring manu-

Make LIGHT WORK of LONG JOBS *with* STARRETT DIAL INDICATORS

Any way you work it, it's a long, slow job checking the cutting edges of a broach — but this man knows the fastest and the easiest and the most accurate way to do it. He's using a Starrett LAST WORD Dial Indicator Model D-10 mounted on a Starrett Vernier Height Gage by means of a Universal Shank. It can be set up in a matter of seconds and the sensitive action and big, honest face make measurements in ten-thousandths unusually rapid and error-proof.

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facturing programs. Merchant wire production is holding at about the same rate, with orders slightly more active.

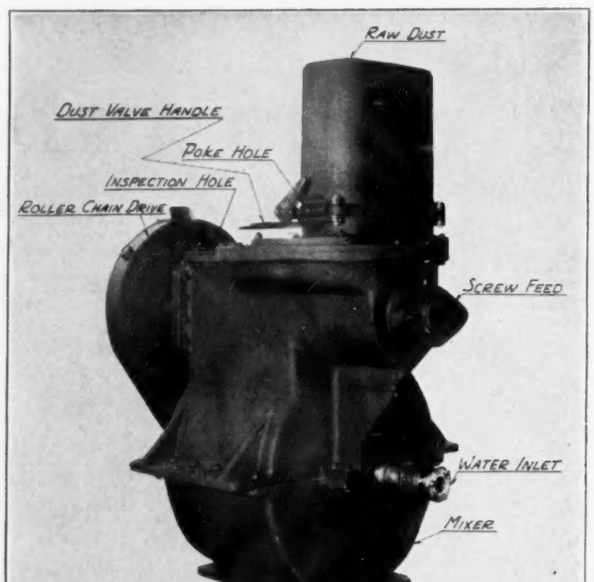
Cleveland—Specifications for manufacturing wire and merchant wire products continue practically unchanged. However a slight improvement is noted in the attitude of jobbers. Wire going to the manufacturing trade remains unchanged at the low level of January, with the expected improvement from auto partsmakers and other important consumers still lagging.

Chicago—Shipments of merchant wire products to distributors in rural districts are slightly heavier. Buying hesitancy still is apparent in that direction, however, and stocks are below the corresponding period of the past two years. Business in manufacturers' wire is slightly more active, but no significant changes have occurred in demand so far this month. Automotive orders remain light, but some pickup is anticipated during March.

Boston—Curtailed operating rates among leading fabricators of wire products continues to restrict buying to small orders, especially in manufacturers' wire. Several New England mills have booked fair cable orders for the navy and other government departments. Considerable of this material is being awarded by lot as bids are generally uniform.

New York—Tonnage released as a result of reaffirmed prices on wire products has been light, buying and incoming volume, mostly in small shipments, being practically unchanged. A gradual improvement is developing for merchant products. Some export inquiry prevails for wire rods.

Birmingham, Ala. — Satisfactory demand for wire is evident, although there is no material improvement over market conditions of two weeks ago.



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The Brosius Conditioner conditions the dust directly at the dust catcher, making it ready for the sintering plant. The sensible heat is removed and the dust conditioned by being passed through a rotating cage fitted with a series of bars which agitate the dust and mix it with water. Any degree of moistening can be obtained as the amount of moistening is governed by the amount of water supplied.

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Rails, Cars

Track Material Prices, Page 79

New York, New Haven & Hartford has been given court permission to buy 7580 tons of rails and the New York Central usually places some tonnage in March. The latter's requirements this time may run 20,000 to 35,000 tons, according to trade estimates.

New York, New Haven & Hartford has placed four more diesel-electric locomotives and Chicago, Rock Island & Pacific has leased ten diesel switchers, with option to buy after seven years.

Canadian National in addition to passenger equipment recently awarded has divided orders for 2000 steel sheathed box cars among three builders. Canadian Pacific has not yet made awards on its recent inquiry for 2700 miscellaneous freight cars.

Car Orders Placed

Canadian National, 2000 steel sheathed box cars, 700 to National Steel Car Corp., Hamilton, Ont., 600 to Eastern Car Co., Trenton, N. S., and 700 to Canadian Car & Foundry Co., Montreal.

Chicago, Burlington & Quincy, 100 Rodger ballast cars, to American Car & Foundry Co., New York.

Locomotives Placed

Chicago, Rock Island & Pacific, ten diesel switching locomotives leased from Electro-Motive Corp., La Grange, Ill.

New York, New Haven & Hartford, four diesel-electric switch engines, to American Locomotive Co., New York; these are in addition to the six recently noted as placed with the same company.

Rail Orders Placed

Bangor & Aroostook, 1940 tons to Bethlehem Steel Co., Bethlehem, Pa., and 950 tons to Carnegie-Illinois Steel Corp., Pittsburgh.

Car Orders Pending

Eastern Gas and Fuel association, 50 steel hopper cars; bids asked.

Navy, 50-ton twin hopper car, Pullman-Standard Car Mfg. Co., Chicago, low bidder.

Rail Orders Pending

Central Railroad of New Jersey, limited tonnage of rail and fastenings for a terminal in Elizabethport, N. J., bids March 4.

Shapes

Structural Shape Prices, Page 78

New York—New structural steel inquiry has again leveled off, 1120 tons for the final section, Flushing river bridge, closing March 3, leading. Bids on the Queens land section, East river tunnel, Feb. 24, 4500 tons were postponed. The volume of bridge tonnage pending for this period is light; also lettings.

New business booked by the structural steel industry during January was indicative of the general business recession, according to the American Institute of Steel Construction. During January new orders booked were 30.6 per cent of normal (the yearly average for the period 1928-31 inclusive), whereas shipments were 36.9 per cent of normal. New business booked during January was a little better than one-half the average monthly bookings of last year, and the volume of shipments in January was two-thirds of last year's average. Totals for January were: Bookings 71,619 tons, and shipments 86,421 tons.

Pittsburgh—The shape market continued unchanged from last week, with inquiries and orders both slow. Among the larger inquiries are those for buildings to be erected at the New York world's fair, and the most recent of these are for the Ford Motor Co.'s exhibit building and the general railroad exhibit building.

Cleveland — Structural market is substantially unchanged since the first of the month, with awards and inquiries few and limited to small tonnages. The Pittsburgh-Des Moines Steel Co., Pittsburgh, recently booked 250 tons for a new plant for the Linderme Tool Co., Cleveland. A state bridge project at Toledo, O., involving 300 tons, went to Wisconsin Bridge & Iron Co., Milwaukee. Renewal of prices for second quarter is expected to stimulate confidence in going ahead with proposed expansion programs.

Chicago—Structural inquiries are heavier, due principally to the appearance of a fairly large number of small projects. Bridge inquiries for Illinois involve 2400 tons. Early placing of 4000 tons of fabricated steel for the Clarksville, Mo., dam is in prospect following the recent opening of bids. Central Engineering Co. is low for the general contract.

Boston—An 800-ton bridge, Ashland-Bridgewater, N. H., closing March 10, is the outstanding new structural steel project. Inquiry is slightly heavier with bids in on close to 3000 tons for a surgical building, Massachusetts general hospital, Boston. Public work makes up the bulk

Shape Awards Compared

	Tons
Week ended Feb. 26	8,409
Week ended Feb. 19	12,814
Week ended Feb. 12	8,748
This week, 1937	22,708
Weekly average, year, 1937	16,060
Weekly average, 1938	13,443
Weekly average, January	17,978
Total to date, 1937	246,893
Total to date, 1938	120,983

Includes awards of 100 tons or more.

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FRANCE Fenwick, S. A.
CANADA John Bertram & Sons Co. Ltd.
ENGLAND Burton, Griffiths & Co. Ltd

of active tonnage. Rugo Construction Co., Boston, is low on the 600-ton Spaulding high school, Rochester, N. H.

Philadelphia — Fabricators are somewhat encouraged by appearance of a slight gain in construction other than Pennsylvania state institutional projects. This condition may help take up the slack when Pennsylvania program terminates about April 1. Bids are due March 18 on Security prison, Mt. Gretna, Pa., taking considerable tonnage of bars. Joseph J. Bendix, Uniontown, Pa., is low at $488,000 on Teachers college, Indiana, Pa.

San Francisco—The general contract for improvement of the Alameda, Calif., waterfront for the navy department, has been let to the San Francisco Bridge Co., San Francisco, at $960,000 and involves approximately 2200 tons of sheet steel piling. The latter material has not yet been placed. Awards aggregate 2731 tons, bringing the year's total to 10,014 tons compared with 32,613 tons in 1937.

Seattle—Fair sized tonnages are developing but meanwhile fabricating plants are short of work. No awards in excess of 100 tons were reported this week. L. H. Hoffman, Portland, has the general contract for the Oregon state library at Salem, involving 500 tons or more. Washington state will call bids soon for the Hylebos bridge, Tacoma, requiring about 500 tons. Other projects involving sizable tonnages are planned but have not yet developed.

Shape Contracts Placed

1050 tons, apartment project, Eastchester, N. Y., to Dreier Structural Steel Co., New York.

750 tons, steel piling, Jetty Indian Inlet, Del., to Carnegie-Illinois Steel Corp., Pittsburgh; through Jesse A. Howland & Sons Inc., Seabright, N. J.

565 tons, three oil heaters, Nederland, Tex., to Mosher Steel Co., Houston, Tex.; The Lummus Co., New York, general contractors and engineers.

480 tons, Pennhurst state school, Chester county, Pennsylvania, to Keystone Structural Steel Co., Trenton, N. J.

380 tons, bridge on Yerba Buena island, San Francisco, to Judson-Pacific Co., San Francisco.

370 tons, floor plates for incinerator building, Detroit, to Fort Pitt Bridge Works, Pittsburgh.

325 tons, 32,000 feet, curb angles, Riverside park, New York, to American Bridge Co., Pittsburgh; through state procurement officer, treasury department, New York.

300 tons, bridge, Toledo, O., to Wisconsin Bridge & Iron Co., Milwaukee.

285 tons, state school building, California, Pa., to Guibert Steel Co., Pittsburgh.

260 tons, state bridge, route 158, section 4-B, Pleasant Hill, Ill., to Bethlehem Steel Corp., Bethlehem, Pa.

260 tons, junior high school, Westhampton, N. Y., to Weatherly Steel Co., Weatherly, Pa.; through John J. Dixon Co., New York.

250 tons, plant building, Linderme Tool Co., Cleveland, to Pittsburgh-Des Moines Steel Co., Pittsburgh; through Gordon F. Ward, Cleveland.

225 tons, buildings, state teachers college, Edinboro, Pa., to Rogers Structural Steel Co., Corry, Pa.

210 tons, addition, St. James church, New York, to Grand Iron Works, New York.

200 tons, store, S. H. Kress Co., Austin, Tex., to Mosher Steel Co., Houston, Tex.

200 tons, Dennison vocational high school, Washington, to Fort Pitt Bridge Works, Pittsburgh.

190 tons, Norristown state hospital, Norristown, Pa., to Phoenix Bridge Co., Philadelphia.

180 tons, bridge, Adams county, Ohio, to Bethlehem Steel Co., Bethlehem, Pa.

170 tons, freight apron, Northwestern Pacific railroad, Tiburon, Calif., to American Bridge Co., Pittsburgh.

168 tons, shapes and bars, class room building, University of Georgia, Athens, Ga., to Southern Steel Works Co., Birmingham, Ala., and Truscon Steel Co., Youngstown, O.; A. J. Honeycutt Co. Inc., Birmingham, general contractor.

160 tons, warehouse, Matson Navigation Co., San Francisco, to Western Iron Works, San Francisco.

158 tons, prison building, Auburn, N. Y., to Phoenix Bridge Co., Philadelphia.

153 tons, Lincoln high school for negroes, Dallas, Tex., to Mosher Steel Co., Dallas.

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150 tons, high school, Thomaston, Conn., to Connecticut Steel Erecting Co., New Haven; F. Buzzi, Torrington, Conn., general contractor.

150 tons, grade and high school, Dundee, N. Y., to Gray Structural Co., Rochester, N. Y.; J. A. J. Construction Co., Brooklyn, general contractor.

140 tons, hall of records, Dover, Del., to Lansdale Structural Steel Co., Lansdale, Pa.

140 tons, repairs, bridge 10.19, Thomson, Pa., to Fort Pitt Bridge Works, Pittsburgh.

120 tons, bridge 169FA-682, Clay county, Missouri, to St. Joseph Structural Steel Co., St. Joseph, Mo.

110 tons, building, Westmoreland Garment Corp., Greensburgh, Pa., to Levinson Steel Co., Pittsburgh.

110 tons, shapes and miscellaneous steel, incinerator, Greenwich, Conn., to Pittsburgh-Des Moines Steel Co., Pittsburgh.

100 tons, bars and shapes, garage and building, Southern New England Ice Co., Hartford, Conn., to Lehigh Structural Steel Co., Allentown, Pa., and Concrete Steel Co., New York.

100 tons, shapes and bars, highway project RC 2501, Montgomery county, New York, to Lackawanna Steel Construction Co., Buffalo, and Strope Steel Corp., Albany, N. Y.; Green Island Construction Co., Green Island, N. Y., general contractor.

Shape Contracts Pending

3500 tons, bridge, Omaha, Nebr., again up for figures in March.

2924 tons, if welded; 3092 tons if riveted, dam No. 24 on Mississippi river at Clarksville, Mo., Central Engineering Co., Davenport, Ia., low; also includes 3000 tons of sheet piling.

2200 tons, sheet steel piling, improvement Alameda, Calif., waterfront for navy department; general contract to San Francisco Bridge Co. at $968,000.

1800 tons, bridge, Lacon, Ill.

1750 tons, transportation building, World's Fair, New York; George A. Fuller Co., New York, general contractor.

1120 tons, northerly unit and completion, Flushing river bridge, New York; bids March 3, department of public works, New York.

1100 tons, building, Ford Motor Co., World's fair, New York.

1000 tons, alterations, Grand Central post office, New York; O'Driscoll & Grove, New York, general contractor, at $696,131.

950 tons, bridge, Lewiston, Idaho.

860 tons, state tuberculosis sanitorium, Mt. Alto, Pa.

800 tons, bridge, Ashland-Bridgewater, N. H., 800-foot twin span deck truss structure with I-beam approach spans; bids March 10, New Hampshire department, F. E. Everett, commissioner, Concord, N. H.

600 tons, Spaulding high school, Rochester, N. H.; Rugo Construction Co., Boston, low.

590 tons, bridges, East St. Louis and Greenfield, Ill.

500 tons, or more, Oregon state library, Salem; L. H. Hoffman, Portland, general contractor.

500 tons, plant extension, Firestone Rubber & Metal Products Co., Wyandotte, Mich.

500 tons, health center buildings, New York; Caulway Inc., New York, low.

500 tons, hospital building, Danville, Pa., General State authority.

375 tons, hospital, Newington, Conn.

367 tons, steel girder viaduct, project 1T4, Blue Ridge parkway, Patrick county, Virginia; bids March 10, bureau of roads, department of agriculture, Washington. Project also takes 34 tons, steel castings.

350 tons, state bridge over Little Blue river, Hanover, Kans.

330 tons, bulkhead gates for turbine draft tube, Grand Coulee power plant, Columbia basin project, Washington, Koppers Co., Bartlett Hayward division, Baltimore, at $34,545, ½ per cent discount, f.o.b. point, Baltimore, and Mississippi Valley Structural Steel Co., St. Louis, $34,545 net, f.o.b. St. Louis; bids Feb. 9, bureau of reclamation, Denver, spec. 752.

300 tons, dam structures, Gunthersville, Ala.

300 tons, buildings, Indiana State Teachers college, Indiana, Pa.

300 tons, continued treatment building No. 4, St. Elizabeth's hospital, Washington; John McShain, Baltimore, low; bids Feb. 23.

260 tons, highway bridge, Lake county, Illinois, Olson Construction Co., Waterloo, Ill., general contractor.

250 tons, power house Missouri State Prison, McCarthy Bros. Construction Co., St. Louis, low.

245 tons, crusher building, Turtletown, Tenn.

230 tons, state bridge RC-3934, Buffalo.

200 tons, crippled children's home, Buffalo; Charles H. Wing Co. Inc., Buffalo, low.

200 tons, building, M. J. Heinz Co., Salem, N. J.

200 tons, state hospital building, Marlboro, N. J.

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A Lot of Bosh

■ Of course you've read every word of Haven's fine article, "Lean Ores," which begins on page 48 (and ends on page 74) of this week's book. We understand that provisions have been made to equip that furnace mentioned therein with bosh tuyeres. The English are all for making a furnace last longer than possible, you know, and to helk with the tonnage—sort of an opposite school of thought from the Ameddican idea. And seven years is a fair length of time for a lining to last. Guess they're not in much of a hurry over there.

Printery Party

■ For a while it looked as though this periodical packet of paper would be delayed this week. Editors, arriving at the scene of the weekly crime Thursday morning, found no pages yet made up. It seems the boys down in the printery had a party the night before and even the dogwatch had gone to celebrate. Louis Pomeroy, linotype operator, and John Farley, binder machine operator, were the felicitated fellows at the affair, each having served 30 years with our company. Gold watches were presented, which must have aided in getting the boys back on time Thursday morning to start whooping STEEL out on schedule.

Help, Help!

■ O, they cut down the old Recent Publications of Manufacturers page, and they hauled it away to the mill (or was it the Readers' Service Department?). And now they tell us it's going to pop up in our prominent periodical under an alias. Well, there's nothing like heckling it off to a good start. You see, the engineers used to write the page and just recently decided to change the name to the more virile-sounding title of Industrial Literature. Then along came the RSD, took the page, dolled it all up with a lot of superschmaltz and named it Helpful Literature, of all things. Helpful literature—tsk, tsk, don't you just get a picture of desperate, disheartened and despairing captains of industry groping blindly in the dark for literary guidance? And the RSD, with its Helpful Literature, helping them bravely to see the light? Nevertheless, you can now get all the industrial literature you want, and at the mere drop of a card. Try it starting this week.

Westward Hope

■ We're working up a strong hankering to get ourselves included in that Metal Show out in sunny (sic) Los Angeles next month. After we read all about it we tried to conjure up a sort of Horace Greeley boss who would say "Go west, young man, go west." We almost had him, too, except that we mistook a "Wake up" for a "Go west."

The A.I. of M. and M.E.

■ This A.I.M.E. stuff has gone far enough. We demand the missing M be restored. If American Institute of Mining and Metallurgical Engineers is the name, then A.I.M.M.E. must be the initials. Henceforth, we'll throw in that other M for no extra charge (a service unobtainable in other columns, even our own editorial section, where A.I.M.M.E. is still A.I.M.E.).

Chicken Food

■ The A.I.M.M.E. heard, at its symposium of powder metallurgy, all about the possibility of coins being made out of powder. And they tell us that such money would be harder and would also last a great deal longer. What the helk, money's plenty hard enough right now, but if the A.I.M. etc. can think of a way to make it last longer—well, more powder to them.

—SHRDLU

200 tons, Seattle ball park; bids soon; William Aitken architect.
195 tons, highway bridge, Logan county, Illinois, Missouri Bridge & Iron Co., St. Louis, low.
180 tons, deck plate girder spans, Chicago, Burlington & Quincy railroad, Sheffield, Ill.
170 tons, almshouse, New Lisbon, N. J., for Burlington county, New Jersey.
167 tons, crossing near Walsenburg, Huerfana county, Colorado; bids March 3.
126 tons, sheet piling, bureau of reclamation, invitation 24,608-A, Blaisdell, Ariz.; bids opened.
110 tons, shapes and bars, grade crossing and highway work, including pedestrian underpasses, Mansfield and Sharon, Mass.; bids March 8, department of public works, G. H. Delano, chief engineer, Boston.
100 tons, post office, Cape May, N. J.
100 tons, theater, Philadelphia.
100 tons, armory, Milford, Del.

Reinforcing

Reinforcing Bar Prices, Page 79

New York — With most sellers of reinforcing bars holding for 2.84c, delivered job, this district, general contractors for construction requirements are still holding off placing the bulk of pending tonnage, seeking concessions. New inquiry is light, including several hundred tons of mesh for upstate New York highways, but several thousand tons have accumulated during recent light purchasing.

Pittsburgh — New inquiries for reinforcing bars are quite small and production is continuing at the same slow rate. No appreciable upturn is expected before spring, when weather conditions may permit further activity on larger projects now contemplated.

Chicago — Reinforcing bars are more active, purchases of small lots showing a slight increase the past week, while several larger tonnages also were placed. Outstanding is the purchase of 1044 tons for a new retail store here for Sears, Roebuck & Co.

Cleveland — Awards are limited to small tonnages, well under 50 tons. Private work is practically at a standstill despite renewal of sec-

Concrete Bars Compared

	Tons
Week ended Feb. 26	**4,410**
Week ended Feb. 19	**4,920**
Week ended Feb. 12	**5,570**
This week, 1937	**6,993**
Weekly average, year, 1937	**6,266**
Weekly average, 1938	**5,559**
Weekly average, January	**6,446**
Total to date, 1937	**31,113**
Total to date, 1938	**50,035**

Includes awards of 100 tons or more.

ond quarter prices. Inquiries are also for minor quantities with state work predominating. Cuyahoga county, Ohio, commissioners will advertise for approximately 500 tons of reinforcing bars within the next ten days for the Main street bridge piers and abutments. Fabricated prices are weak.

Boston — An encouraging lift in reinforcing steel inquiry is featured by heavier bridge and highway work, six reinforced structures, 365 tons, Westport and Fairfield, Conn., leading. New Hampshire is also taking estimates on jobs requiring several hundred tons. Building construction needs, mostly public work, notably schools, are slightly larger. Buying is mostly in small lots, delay on the part of most contractors to purchase resulting in a gradually increasing unplaced volume.

Philadelphia—Benefiting from the large amount of work involved in the Pennsylvania state program, at least one district fabricator is booked through midsummer. As a consequence prices are somewhat firmer since the trade is unwilling to compete as actively for business as two or three months ago. Private construction is still slow although it is beginning to show some signs of improvement.

San Francisco — Although numerous small reinforcing bar awards were placed, aggregating 962 tons, none were in excess of 100 tons. This brought the year's total to date to 18,912 tons compared with 7699 tons in 1937. Bids have just been taken on 4500 tons for the Possum Kingdom dam, Temple, Texas.

Seattle — Business is slow, confined to small lots. No new projects involving sizable projects have developed. Mill operations are spasmodic. The week's awards totaled only 150 tons, for schools at Kent and Mt. Vernon, Wash., taken by Bethlehem Steel Co., Seattle. Tonnages pending do not exceed 2000 tons and include an unstated amount for the Oregon state library at Salem. Prices remain firm.

Reinforcing Steel Awards

1200 tons, sludge incinerator building, Detroit, to Ceco Steel Products, Omaha, Nebr.

1044 tons, retail store building, Sears, Roebuck & Co., Chicago, to Joseph T. Ryerson & Son Inc., Chicago.

675 tons, Chevy Chase park and shop stores, Washington, to Hudson Supply & Equipment Co., Washington.

235 tons, Lincoln high school for negroes, Dallas, Tex., to Southern States Steel Co., Dallas; through Dolph-Bateson Construction Co., Dallas, general contractor.

210 tons, for United States veterans' administration hospital at Chillicothe, O., to Pollak Steel Co., Cincinnati, through James I. Barnes Construction Co., Springfield, O., general contractor.

175 tons, school, Richmond, Ind., to Calumet Steel Co., Chicago.

156 tons, state purchasing bureau, Baltimore, to Maryland Steel Products, Baltimore.

150 tons, schools at Kent and Mt. Vernon, Wash., to Bethlehem Steel Co., Seattle.

150 tons, constructing quartermaster, Fort Sam Houston, Texas, to Tennessee Coal, Iron & Railroad Co., Houston office, at 2.63c f.o.b. Camp Stanley, Tex., with deduction of 15 cents per 100 pounds for material in mill lengths of 20 to 60 feet; bids Jan. 29, schedule 6278-38-7.

110 tons, Ashland avenue paving, Chicago, to Joseph T. Ryerson & Son Inc., Chicago.

105 tons, Andrews school, Bristol, R. I. to Concrete Steel Co., New York; New England Concrete Co., Providence, R. I., general contractor.

100 tons, high school, East Moline, Ill., to Calumet Steel Co., Chicago.

100 tons, state highway project 37-4, Dutchess county, New York, to Bethlehem Steel Co., Bethlehem, Pa.; Frank T. Westcott, North Attleboro, Mass., general contractor.

Reinforcing Steel Pending

675 tons, building, Sears Roebuck Co., Chicago.

600 tons, Central Nebraska Public Power

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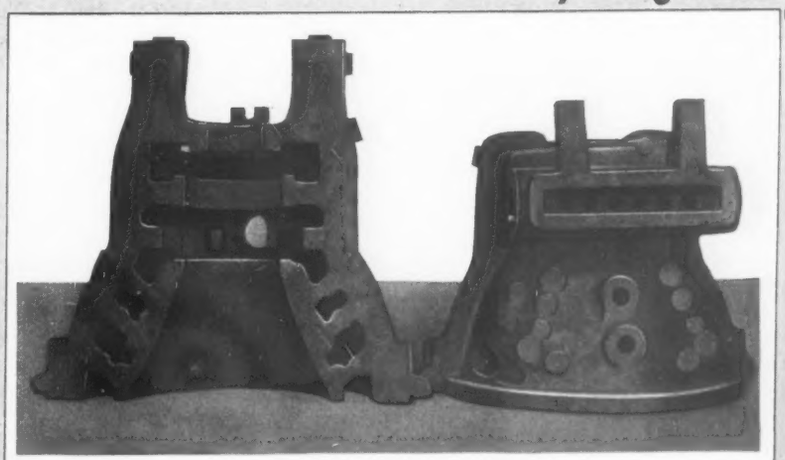

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565 tons, dam No. 4, Mississippi river, Clarksville, Mo., Central Engineering Co., Davenport, Iowa, low.

370 tons, northerly unit and completion, Flushing river bridge, New York; bids March 3, department of public works, New York.

365 tons, deformed bars, six reinforced concrete bridges, three each, Westport and Fairfield, Conn.; bids Feb. 28, highway division, department of public works, Hartford.

350 tons, state office building, Jefferson City, Mo., Lehr Construction Co., St. Joseph, Mo., general contractor.

289 tons, paint and oil storage warehouse, Mare Island, Calif.; DeLucca & Son, Inc., San Francisco, low.

275 tons, state highway project, Saratoga county, New York; bids March 8, division of highways, Albany.

190 tons, addition to Griesedieck Bros. Brewery Co., Woerman Construction Co., St. Louis, low.

182 tons, bridge, Los Angeles county, California; bids March 3.

120 tons, viaduct, project 1T4, Blue Ridge parkway, Patrick county, Virginia; bids March 10, bureau of roads, department of agriculture, Washington.

110 tons, court house addition, Bridgeport, Conn.

109 tons, West Ford, Bitterroot storage project, Montana; bids March 4.

100 tons, St. Katherine addition, Burlingam, Calif.; bids opened.

100 tons, building, National Cash Register Co., Washington.

Unstated tonnage, Oregon state library, Salem; L. H. Hoffman, Portland, general contractor.

Pig Iron

Pig Iron Prices, Page 80

Pittsburgh—Most producers have reaffirmed prices for second-quarter. Depletion of stocks among iron users is still going on and orders have come into the market from sources which have been quiet for some months. It is believed the large stocks laid in by most users previous to price rises last year are now reaching bottom and will shortly be reflected in better orders to producers. Frequent small orders which have been the rule for some time are slowly being supplanted by larger ones.

Chicago—Pig iron producers have extended current prices through second quarter at $24, Chicago furnaces, and $24.50, Duluth, for No. 2 foundry and malleable. To date the price extension has resulted in little changes in buying, though some foundries which had postponed placing orders pending clarification of prices are expected in the market with small purchases. Shipments so far this month are slightly ahead of the January rate. Foundries in some instances still are reducing inventories, and are issuing releases covering requirements only a short distance ahead.

Cleveland—Producers report that new business for second quarter delivery has not developed, despite the fact that prices have been announced unchanged for that period. Foundries are still operating approximately two days out of a week. This condition is not limited to one or two industries, but is spread through those foundries supplying castings to stove, machine tool, cast pipe and auto industries. Stocks in most foundries yards are still large when compared with current operations.

Boston—The Everett, Mass., furnace, as expected, followed pig iron producers in other districts in reaffirming prices for second quarter. Several times during the last two years Mystic has taken the initiative in announcing quarterly prices, but of late has followed other districts. There has been only slight change in hand-to-mouth buying by consumers. Foundry melt is still slack and users are releasing for shipment little beyond current needs. Not much volume is booked beyond March delivery.

New York — Pig iron buying continues of strictly hand-to-mouth character. General reaffirmation of pig iron prices for second quarter has buoyed sentiment, but has not resulted in any appreciable pick-up in tonnage. Some sellers report orders are slightly more numerous, but note little change in total volume. Most foundries are still averaging two or three days a week, although at least one manufacturer of valves is running full schedule. Announcement of an advance in freight rates, which may be made in the near future, may result in a flurry, with consumers endeavoring to lay in some excess tonnage before the advance becomes effective.

Philadelphia — Announcement of unchanged prices on pig iron for second quarter has roused little interest on the part of consumers. Buying continues for current needs only although consumer inventories are low. Soil pipe makers are reported operating at about 30 per cent but some of these are using scrap principally and others have large stocks of iron. Stovemakers are still slow. Machinery builders provide one of the brightest spots.

Buffalo—Further indication that foundry inventories are low is seen by the rush shipment request accompanying most orders. There appears to be little inclination to buy for the future, despite the reaffirming of prices. Shipments are holding at about the same level as in January.

St. Louis—Shipments of pig iron are running ahead of the January average. There has been a moderate

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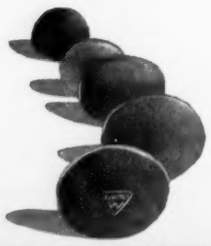

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pickup in new buying, though as has been the case for a number of weeks, orders are confined to small lots for prompt delivery. Some foundries have placed inquiries for larger tonnages, but thus far nothing has been done.

Important melters as a rule are well situated in the matter of inventories, and with no price advance in prospect, they are using reserves without replacement. Lesser melters, on the other hand, are scantily stocked. The melt has increased slightly, the betterment being mainly with jobbing foundries, several of which have increased operations to four days per week. The majority, however, are busy only two to three days.

Cincinnati—Pig iron prices have been reaffirmed for the second quarter, so far causing no change in the dull market. Shipments for February were close to the January tonnage, against specifications on old orders and carload spot orders. The melt is unchanged at less than 40 per cent of foundry capacity.

Jackson county producers of high silicon silvery and high manganese pig iron have reaffirmed current prices for second quarter delivery.

Birmingham, Ala. — Some improvement, with indications of continued pick-up, is noted in the Southern pig iron market. Two additional blast furnaces were lighted by the Tennessee company this week to bring the district's total to 13. Confirmation of prices, announced last week, is expected to have a beneficial effect on the market with books opened for second quarter business.

Toronto, Ont.—Blast furnace representatives say sales are well sustained and holding around 2000 tons weekly. New awards have been for spot delivery with no additional forward delivery contracts reported. Daily melt is around 70 per cent, with indications for higher levels soon. New orders for the steel industry are increasing and soon will be reflected in higher consumption of pig iron. Production of iron continues at approximately 65 per cent of all Canadian capacity with six furnaces blowing. Prices are firm and unchanged.

Scrap

Scrap Prices, Page 82

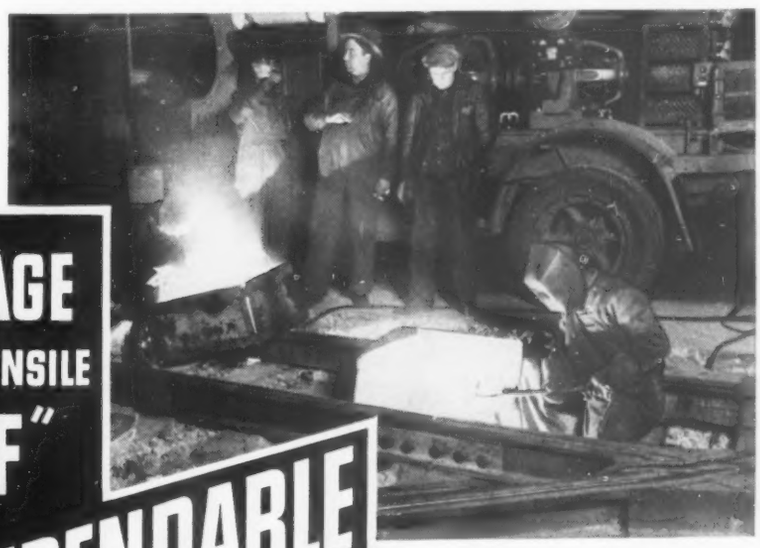
Pittsburgh—Downward revision of 50 cents a ton in No. 1 heavy melting steel was made this week in the Pittsburgh district. This follows offerings and sales here at $13.75, with some sales still being noted at $14. Since export prices, which were giving support in this area, have weakened noticeably, the drop here is probably directly resultant from that.

Cleveland—Iron and steel scrap consumers continue to show little interest. Occasional carloads are moving, mostly blast furnace material and some specialties. Quotations are unchanged but are considered nominal as in weeks past.

Chicago—Scrap continues dull, but prices are steadied by the small volume being offered. Quotations are nominal in a number of instances. No. 1 heavy melting steel remains at $11.50 to $12 on the basis of last mill purchases, but sellers are unable to pick up any appreciable quantity at less than $12. Only a portion of scrap on recent railroad lists was sold.

Boston—Confined mostly to buying against orders for export, demand for scrap is dull with several grades slightly easier and others barely maintained despite sluggish domestic activity. Some No. 1 heavy melting steel scrap has been moving to Worcester against contracts at $13, delivered, while prices paid for this grade for dock delivery, export, are unchanged, $14 being paid for most material.

New York—With domestic shipments practically at a standstill and export buying more or less routine brokers have marked down bids for domestic consumption on several grades, including stove plate, machine shop turnings and grate bars. No. 1 machinery cast and No. 2 cast are off 50 cents more, a decline of $1 during the last two weeks. Japan continues to purchase indi-



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Philadelphia—While a number of grades of scrap have been adjusted downward the market is not materially weaker than last week when heavy melting grades dropped 50 cents on lessoned support by the export market. Exporters are paying $14.50 for No. 1 steel but the same price is also being paid against orders for domestic mills, which are still restricting shipments. No. 1 steel is in relatively better demand for export than No. 2, which means the latter might be had as much as $2 under the former, either for domestic or export shipment. Turnings are entirely nominal although one mill might be interested at bargain prices. Some observers fail to see how prices, especially on export grades, can go much lower as large tonnages are owed to European cartel members and to Japan and the South is said to be largely drained of satisfactory material.

The city of Philadelphia opened a salvage yard for handling scrap materials through which it hopes to obtain full market prices for its accumulations. Scrap sales in 1937 totaled $164,827 but the 1938 figure is expected to be considerably larger.

Buffalo—Allowing their regular sellers to ship scrap at $13 a ton for No. 1 heavy melting steel and $11 for No. 2, the leading consumer acquired 2000 tons during the past week. A weak tone dominates the market with no sales of consequence reported.

Detroit—March lists of automotive scrap are now up for bidding and indicated tonnages are somewhat lower than for the current month, a surprising fact in view of the probability of considerably accelerated production in March. Since this scrap is bought on an accumulation basis the actual tonnage available may exceed these early estimates.

Extent of weakness in present prices is difficult to determine, but in view of recent sales, borings and turnings are being marked down 25 cents. Many quotations are purely nominal, dealers contending they are too high, but brokers finding it impossible to buy material at some of the prices quoted.

Cincinnati — The prolonged absence of mills as buyers of iron and steel scrap has aggravated market dullness. Miscellaneous dealings are, light but provide the only activity. Quotations fail to shake mills from decision to reduce scrap inventories, reported adequate for near needs. Prices are unchanged, but nominal.

St. Louis—Iron and steel scrap values receded further under slack demand and a number of important items, including heavy melting steel, receded to new lows on the present movement.

Birmingham, Ala. — Scrap continues dull, especially steel. Some movement, but in small lots, is reported in cast. Receipts from most quarters continue light.

Toronto, Ont.—Inquiries for iron and steel scrap are increasing but there has been little change in deliveries by dealers in the past week. Steel mills continue to take heavy melting steel and turnings as offered by dealers, and foundries are inquiring for machinery cast and stove plate. Wrought scrap also is in fair demand.

Warehouse

Warehouse Prices, Page 81

New York — Warehouse volume this month with most jobbers was about in line with January and to date there has been practically no upturn in demand. Heavy products, notably shapes and plates, lag behind other materials. Prices are unchanged with some scattered shading still prevalent.

Cleveland—No improvement has been noted in sales and shipments out of warehouse. However, total tonnage shipped so far this month is ahead of January but not to the extent expected. Distributors have followed the mills' lead in reducing price of cold-rolled sheets.

Chicago — Warehouse sales are steady, variations from the rate a month ago being small. Trend in business the past few weeks has followed closely the usual pattern for this period, and only minor fluctuations are looked for the remainder of the quarter.

Philadelphia—February tonnage of steel from store is slightly heavier although extension of prices for second quarter has resulted in no particular stimulus to consumer interest. Heavier products, such as plates and shapes, are beginning to participate in the improvement shown by lighter grades, though the gain is small. It is reported inventories of smaller warehouses have been worked down considerably but that stocks of larger interests probably are still above the average.

Buffalo—Warehouse distributors are cheered as the first carload shipments in some time are reported. A better feeling is apparent as more jobs are being figured.

Cincinnati—Warehouses will show a moderately heavier tonnage for February than in January on small-lot buying. Reduction in prices on cold-rolled sheets, to match mill action, failed to bring out any heavier business, as buyers continue policies

of ordering only for immediate requirements.

St. Louis—Warehouse sales are running ahead of January, though measurably below a year ago. Sheet demand is somewhat more diversified than heretofore, but the chief consuming groups have not expanded their takings and miscellaneous requirements still predominate. Fencing materials are quiet, with the movement to the rural areas the smallest for this particular period in more than five years. One leading interest reports heavier sales of special steels, including tool and stainless items. The entire category of building materials remains sluggish.

Seattle—Inquiry is slightly improved but below normal due to lack of substantial construction and cessation of federal spending. Industrial activity is slack and replacements are of small proportions. Prices are being generally maintained.

Iron Ore

Iron Ore Prices, Page 82

Cleveland—Lake Superior iron ore consumed by blast furnaces during January, according to the Lake Superior Iron Ore association, was 1,923,056 gross tons. This is slightly more than the 1,916,588 gross tons consumed in the preceding month but only 41 per cent of the 4,694,312 gross tons consumed in January, 1937. Total ore on hand at lower lake ports and furnaces on Feb. 1 follow:

	Furnaces	Lake Erie docks	Total
Feb. 1	33,007,075	5,874,757	38,881,832
Mo. ago	34,815,965	5,958,873	40,774,838
Year ago	22,985,780	3,761,226	26,747,006

Tin Plate

Tin Plate Prices, Page 78

Pittsburgh—Activity in tin plate production continues unchanged at levels above most other lines of finished steel. Although producers see no immediate cessation of this activity, there is a possibility that production will drop off in the late spring months. Operations are running somewhere in the neighborhood of 50 per cent at this time.

New York—Tin plate specifications are expanding slowly. Many consumers still have excess stocks and with prospects for the next few months less promising than a year ago, there is not the disposition to release specifications for rolling a number of weeks hence that there was this time last year. Some trade interests doubt if domestic requirements will be off much under 10 per cent this year, but it is pointed out that consumers had much more tonnage with which to start the year and that the export outlook is less promising.

Cold Finished

Cold Finished Prices, Page 79

Pittsburgh—Some releases from automotive manufacturers for cold-finished bars have been received by producers in this district. Automotive demands, however, are still quite slow, but these few releases are taken as a sign of a better tone in the automotive industry. Some producers have reaffirmed prices and it is expected others will follow. Farm machinery manufacturers are still supplying a large part of the cold-finished business.

Ferroalloys

Ferroalloy Prices, Page 80

New York—On a daily basis ferromanganese shipments so far this month have been on a parity with the corresponding period in February and interestingly also with the same period in December. However, as February is a short month, total bookings will suffer in comparison. The trade anticipates a mild improvement in March. Prices continue at $102.50, duty paid, Atlantic and Gulf ports, with little likelihood producers opening their books for second quarter much before March 15.

Steadiness also prevails in spiegeleisen, both with respect to shipments and prices. Domestic spiegeleisen, 19 to 21 per cent, is quotable at $33, Palmerton, Pa., and 26 to 28 per cent at $39. With steel production still low, the movement in ferroalloys generally continues limited.

Steel in Europe

Foreign Steel Prices, Page 81

London—(*By Radio*)—New pig iron business is decidedly dull in Great Britain, demand for domestic use and export being slow. Exports of hematite iron are limited by competition. The steel industry finds inquiry smaller and works are well engaged in working off backlogs. Trade in sheets is weak. Continental imports are smaller and demand will absorb only the fixed quota. As a result reimposition of import duties is possible soon.

The Continent reports conditions are still uncertain and price conces-

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sions continue. No large contracts are being booked. Competition from American producers continues a factor in the situation.

Bolts, Nuts, Rivets

Bolt, Nut, Rivet Prices, Page 79

Specifications for bolts, nuts and rivets show little change since a month ago. While prospects for better demand from railroads and the automotive industry within the next 60 days are more favorable, current needs are light. The future trend in sales to farm equipment builders is somewhat uncertain but appears likely to be maintained in better volume than average business from all sources. The tendency among both consumers and jobbers to restrict inventories continues.

High-Speed Steel Cut

Pittsburgh—Important makers of high-speed tool steels are announcing to their trade a reduction in price on certain grades which amount to about 16 per cent. The relief currently felt in the tension long prevalent in the tungsten market now is being passed along to high-speed tool steel consumers in lower quotations. The present reduction is effective immediately in the 18-4-1 type of these products.

The base price of high-speed tool steel has been reduced from 80 cents a pound, to which the recent tungsten flurry catapulted it, to 67 cents a pound. Super-high-speed tool steel now is 77 cents a pound; cobalt high-speed is $1.10; and molybdenum high-speed now is 54 cents a pound.

Import Much Chrome Ore

Philadelphia — Imports of South African chrome ore continue heavy. During the week ended Feb. 19 these imports totaled 3058 tons, bringing the total for the month to date up to 8676 tons. Other imports for the week were: Pig iron, 519 tons from India; steel bands, 14 tons, steel bars, 15 tons and structural shapes, 104 tons, all from Belguim.

Baltimore — Ore arrivals continue to taper somewhat. Full returns for January indicate a total of 165,187 tons of iron ore, against 190,537 tons in the preceding month; 54,099 tons of manganese ore, against 79,603 tons; and 19,242 tons of chrome ore, against 18,259 tons. It is to be noted that in chrome ore only were shipments heavier last month than in December.

Nonferrous Metals

Nonferrous Metal Prices, Page 80

New York—European political developments, culminating in the British crisis, resulted in a strong speculative movement in nonferrous metals in London early last week. Prices soared but the higher levels were not supported by consumer buying and therefore sagged as the week progressed. The net change in prices on the London Metal Exchange for the week was negligible. Activity abroad was reflected here in an increase in sales early in the week, followed by a return to quiet conditions.

Copper—Export copper advanced to a high of 10.40c, c.i.f. before retreating at the close to the opening level of around 10.00c. Sales here jumped to 4372 tons on Monday and to 5333 tons on Wednesday but tapered as the foreign market eased. Consensus is that demand for fabricated products must improve before any sound recovery can be made in the primary market.

Lead — Demand was active throughout the week but prospects for a price advance waned on the reaction abroad. Sellers here continued to quote 4.50c, New York, and 4.35c, East St. Louis. The statistical position has improved due to a definite check in the sharp rise in stocks. The increase in January amounted to only 4270 tons against 15,558 in December.

Zinc—Inquiry for futures was heavy but sellers restricted sales generally to spot through early May. Actual bookings, therefore, continued light with prime western steady at 4.75c, East St. Louis.

Tin—Straits spot advanced to 42.87½c on Wednesday then eased to around 42.25c. Low-priced offerings of Straits spot in the domestic market are being gradually absorbed tending to reduce the difference between the spot and futures prices. American consumers have not been active buyers.

Antimony—Prices held unchanged on the basis of 15.87½c, duty paid New York, for Chinese spot and 13.75c, New York, for American spot. Offering of resale Chinese spot at 15.75c were withdrawn on Feb. 21.

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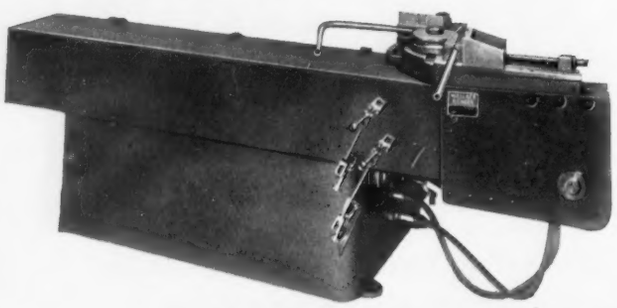

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Equipment

Seattle—Alaska cannery operators are placing requirements and mining interests are preparing for season's opening. Increased business from logging and lumbering industry is expected soon. Two large placer gold drills have been shipped to Saloniki, Greece, by C. Kirk Hillman Co., Seattle. Local plants are also constructing mining dredges for use in Alaska.

Chicago — Quietness in machinery and equipment buying continues most pronounced among the commoner items. Demand for small tools remains slow despite a small pickup recently. Some builders of special machine tools, on the other hand, still experience relatively good business, one interest naming deliveries of six to seven months on new orders. Builders of standard machinery are able to offer better deliveries. Inquiries are fair but prospective buyers are slow to close.

Construction and Enterprise

New York

BINGHAMTON, N. Y. — City plans rehabilitation of water supply system. Early maturity expected. Cost $911,020. J. A. Giles, city engineer.

BUFFALO — Buffalo Niagara Electric Corp., Electric building, plans installing 1,125,000 feet of underground cable. Cost $3,500,000. Maturity in near future. Private plans.

NEW YORK—Warren McArthur Corp., 1 Park avenue, manufacturer of aluminum and other metal furniture, with main plant at Rome, N. Y., has purchased former plant of Bantam Ball Bearing Co., Bantam, Conn., comprising one-story structure which will be remodeled for new works.

NEW YORK — Dufaycolor Inc., 30 Rockefeller Plaza, Alton A. Brody, vice president and general manager, plans installing motors and controls, conveyors, regulators, transformers and other accessories and equipment in new multi-unit plant for producing film for color photography. Work to begin soon. Cost close to $1,000,000.

NIAGARA FALLS, N. Y. — Carborundum Co., Buffalo avenue, plans compressor building. Maturity soon. Private plans.

RENSSELAER, N. Y. — City may develop municipally owned water supply system instead of waiting for development of Greenbrook Creek system. Cost $500,000. Maturity soon. Barker & Wheeler, 36 State street, Albany, engineers.

SENECA FALLS, N. Y. — Village plans new water supply system, including pumping station. Cost $75,000. Nicholas Hill Jr., 112 East Nineteenth street, New York, engineer.

YONKERS, N. Y. — Refined Syrups & Sugars Inc., 120 Wall street, New York, acquired plant of Spreckels Sugar Refining Co. on Hudson river, and plans immediate rehabilitation of boiler houses, char houses etc. Cost including machinery $800,000. J. W. Stafford, care of Suchard Process Corp., 120 Wall street, New York, engineer and architect.

Connecticut

NEW HAVEN, CONN. — New Haven Gas & Light Co., 80 Crown street, plans plant improvements here during 1938. Cost $130,000.

Massachusetts

WORCESTER, MASS.—Worcester Brass & Electroplating Co., 316 Shrewsbury street, Worcester, has filed plans for steam power house, for which general contract has been let.

Pennsylvania

HARRISBURG, PA. — General state authority, 600 North Second street, Harrisburg, receives bids to 11 a. m., March 18, for part 2 of Maximum Security prison, to be built in a corner of Mt. Gretna Green reservation near Lawn, Lebanon county, Pennsylvania. Will include power plant and engine house, sewage disposal plant and water supply system. Total estimated cost of project $1,997,673. Clayton J. Lappley, architect; Henry Hornbostel, consultant architect.

SPARTANSBURG, PA. — Miller & Bryant, G. Miller, engineer, Spartansburg, plans developing new oil field near here. Project includes wells, pumping jacks, tubing, and pumping equipment. Maturity soon. Cost $25,000.

Ohio

ALLIANCE, O. — Taylor-Young Airplane Co. soon takes bids for one-story factory addition. Private plans. Cost of machinery $20,000. Total project cost $40,000.

WRIGHT FIELD, DAYTON, O.—War department, air corps, takes bids to 10 a. m., March 8, for 160 10-ton hydraulic jacks, closed height 9 inches, air corps specification 50096-D, dated Nov. 8, 1937, and amendment No. 1 dated Feb. 8, 1938; until 10 a. m., March 15, for one portable arc welder, air corps specification 50103-B, dated Feb. 2, 1938, delivery Wright field.

Michigan

DOWAGIAC, MICH. — County-wide electric system to serve urban and rural areas financed by WPA and REA grants and loans has been mapped out by officials of Fruit Belt Electrical Co-operative. Dowagiac plant will supply urban customers, and Fruit Belt Electrical Co-operative will buy power to serve farmers.

HOLLAND, MICH. — Allegan County Electric Co-operative plans transmission lines. Has REA approval. Cost $165,000.

Illinois

CHICAGO — Commonwealth Edison Co., 72 West Adams street, soon lets contract for constructing two one-story substation additions, one at California avenue and Roscoe street, the other at 1128 Ardmore avenue. Cost with equipment $50,000. Sargent & Lundire, 140 South Dearborn street, architects.

LOCKPORT, ILL. — Village plans sewage disposal plant. Estimated cost $150,000. Federal funds applied for. J. A. Zelko, Village hall, engineer.

RAMSEY, ILL. — Village board of trustees revising plans and soon takes new bids for well, pumping station, moving pumping station, installing necessary piping for connections. PWA project. Cost $9000. Jan. 20 bids rejected. W. A. Fuller Co., 2916 Shenandoah avenue, St. Louis, Mo., engineer.

Indiana

ROSSVILLE, IND. — Town board, C. Snyder, chairman, soon takes bids for pipe, gate valves, hydrants, fittings for distribution system, and one-story pump house; alternate bids for 150-gallon and 100-gallon deep well pumps, 75,000-gallon, 50,000-gallon, and 40,000-gallon elevated steel tanks for waterworks system. C. Hurd, 1039 Architects and Builders building, Indianapolis, consulting engineer.

Alabama

BIRMINGHAM, ALA. — Alabama Power Co., Birmingham, plans expenditure of $4,403,597 in all departments in 1938, including $13,717 for hydroelectric plants, $1,997,255 for transmission lines, $2,140,912 for distribution, and $219,968 for heating and other departments.

District of Columbia

WASHINGTON—Bureau of yards and docks will take bids (no closing date) for 6000-kilowatt turbo-alternator unit, condenser and auxiliary equipment for local navy yard; also motor-driven centri-

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WASHINGTON — General purchasing officer, Panama canal, takes bids to 10:30 a. m., March 11, for various items in schedule 3335, including portable electric plant and air compressor, delivery Cristobal or Balboa, Isthmus of Panama, Canal zone.

WASHINGTON—Treasury department, procurement division, takes bids to 10 a. m., March 4, for two three-step resistance starters for operation with a 7½-horsepower 220-volt 60-cycle, single phase motor connected to Fairbanks-Morse duplex power pump.

WASHINGTON—Navy department, bureau of supplies and accounts, takes bids to 10 a. m., March 1, schedule 2862, for crawler type shovel with boom, crane and clamshell bucket, delivery Sewall's Point, Va.; until 10 a. m., March 4, schedule 2873, for insulated electric cable, delivery Portsmouth, N. H.; schedule 2874, for heat and flame resistant electric cable, delivery Portsmouth, N. H.; until 10 a. m., March 8, schedule 2875, for motor-driven gasoline pumps and spares, delivery Mare Island, Calif.; schedule 2878, for circuit breakers, delivery Portsmouth, N. H.; until 10 a. m., March 18, schedule 2884, for ferromanganese, delivery Philadelphia, Pa.

Florida

MIAMI, FLA. — Fleisher Studios Inc., Max Fleisher, president, 944 Meridian avenue, Miami Beach, Fla., plans installing transformers and accessories, motors and controls, lighting equipment, conveyors and other equipment in new multi-unit motion picture studio to be located vicinity of Northwest Seventeenth street and Thirtieth avenue, Miami. Includes air conditioning system. Cost $300,000. New York offices at 1600 Broadway, New York. C. Sheldon Tucker, Seybold building, Miami, Fla., architect.

PENSACOLA, FLA. — Gulf Power Co., Pensacola, plans spending in 1938 $339,185 for electric transmission and distribution, $17,197 for gas and $25,000 for other work.

Georgia

ATLANTA, GA. — Georgia Power Co., Atlanta, plans expenditure of $4,798,564 in 1938, including $14,000 for hydroelectric plants, $792,639 for transmission, $3,402,747 for distribution, $36,765 for gas department, and $325,300 for other departments.

WEST POINT, GA.—City, W. H. Scott, mayor, applied to PWA for $14,000 grant to be supplemented by $9000 appropriation by city for waterworks improvements; to include 100,000-gallon tank, booster pump, and general repairs. Robert L. Totten, Atlanta, consulting engineer.

Mississippi

COFFEEVILLE, MISS. — Tallahatchie Valley Electric Power association has REA grant of $220,000 for constructing 227 miles rural line in Tate, Panola, Tallahatchie, Yalobusha and Lafayette counties.

GULFPORT, MISS. — Mississippi Power Co., Gulfport, plans expending $632,903 during 1938, including $187,148 for transmission, $395,505 for distribution and other departments.

South Carolina

CHARLESTON, S. C. — South Carolina Power Co., Charleston, plans expenditure of $869,011 during 1938, including $406,250 for transmission, and $319,452 for distribution and other departments.

GREENWOOD, S. C.—Finance board of Greenwood county, E. L. Brooks, chairman, receives bids March 22 at Greenwood county court house for constructing dam, powerhouse for Buzzards Roost development. Includes three 7400-horsepower hydraulic turbines complete with governors and accessories; three 5000-kilowatt generators with switchgear and step-up station equipment; 40-ton powerhouse crane. Plans and specifications from D. T. Duncan Engineering Co., Greenwood.

Tennessee

CHATTANOOGA, TENN. — Electric power board receives bids March 14 for 11 transformers to be used in three 44,000-volt substations. Estimated cost $105,000. Transformers will be used in substations 1, 3, and 6 to step down current from 44,000 volts to 13,000 volts. Capacity of more than 38,000 kilovolt-amperes. Later will call for bids on oil circuit breakers to cost $100,000. Receives bids March 7 for transmission line, three-phase 44,000-volt aerial line across Tennessee river at foot of Fulton street. Col. Harold C. Fiske, chairman, power board, 12 North Crest street.

DICKSON, TENN. — Town granted $67,000 by REA for constructing 65-mile line in Dickson, Montgomery and Houston counties.

JACKSON, TENN. — City, A. B. Foust, mayor, received $100,000 TVA funds for constructing line to distribute TVA power. This is first portion of $299,500 grant.

MILAN, TENN.—City allotted funds for rural power project by REA. Will build 45 miles of lines, taking in towns of Cades, Whitthorn and Lavinia. W. C. Bauman, West Memphis, Ark., general contractor.

SHELBYVILLE, TENN.—Duck River Electric Membership Corp. has allotment of $184,098 for constructing rural lines in Franklin, Moore and Marshall counties. Total cost $404,000. Will serve 1755 customers along 450 miles of lines.

West Virginia

BECKLEY, W. VA.—City directed by state water commission to install complete sewage disposal plant by July 1, 1939. E. S. Tindale is sanitary engineer for department of health.

GENOA, W. VA.—Appalachian Electric Power Co., Roanoke, Va., plans new transmission line from Echo to Genoa, Wayne county, 12 miles in length. Surveys already authorized.

Virginia

DRY FORK, VA.—Dry Fork Milling Co. plans installing power equipment in connection with proposed rebuilding of grain and feed mill recently damaged by fire.

ROANOKE, VA.—Virginia Bridge Co., Roanoke, has 1938 budget calling for expenditure of $170,000 devoted entirely to modernizing equipment and machinery.

WAYNESBORO, VA.—Lewis A. Bass, project superintendent, Central Virginia Electric Co-operative Inc., has plans and specifications completed and will soon call for bids for first lines in Nelson county distribution system. Work begins in June. Will hook on to Virginia Public Service Co.'s line at Afton and on into Appomatox county.

Missouri

ELLISINORE, MO. — Ozarks Border Electrification association, P. G. Wingo, president, plans constructing 174-mile rural electric line to serve Ellisinore and other nearby towns. Cost $250,000.

ST. LOUIS—John Nooter Boiler Works Co., 1400 South Second street, plans spending $20,000 during 1938 for plant and office alterations and new machinery.

Arkansas

SPRINGTOWN, ARK. — Benton County Utilities Corp., S. N. Douglas, vice president, Gravette, Ark., made plans for distribution system at Springtown and two-mile power line from Gentry to Springtown.

Oklahoma

FAIRVIEW, OKLA. — City made final plans for enlarging power plant by installing 700-horsepower diesel engine and generator. Cost $60,000. E. A. Evans, Fairview, engineer.

HOLLIS, OKLA. — City is arranging $135,000 bond issue for new municipal electric power plant. Special election has been called to approve project. Work to begin in early spring. (Noted in STEEL, Oct. 15, 1937).

SEMINOLE, OKLA. — City has made preliminary plans for proposed sewage disposal plant. Cost $40,000. C. F. Hines, city engineer.

Minnesota

KENYON, MINN.—Bond issue was approved at recent election to finance constructing water supply tank and extending water lines. Estimated cost $13,000. Henry H. Akre, village clerk.

MANKATO, MINN.—Blue Earth-Nicollet Co-operative Electric association, Fred D. Weaver, secretary, is taking bids to 2 p. m., March 4, for constructing 122 miles rural transmission lines in Blue Earth, Nicollet and Le Sueur counties. Specifications obtainable from secretary or consulting engineer, Ellerbe & Co., First National Bank building, St. Paul.

MANKATO, MINN.—Blue Earth-Nicollet Co-operative Electric association, Fred D. Weaver, secretary, takes bids to 2 p. m., March 4, for constructing substation in Blue Earth county 1¼ miles west of Rapidan dam. Plans obtainable from secretary or consulting engineer, Ellerbe & Co., First National Bank building, St. Paul.

ST. JAMES, MINN.—An election will be held soon on a bond issue to finance constructing water filtration plant. Cost about $25,000. Laurette A. Grogan, city clerk.

WESTBROOK, MINN. — Voters approved bonds at recent election to finance purchasing diesel engines for light and power plant and constructing distribution system. T. V. Peterson, village clerk. Buell & Winter Engineering Co., Insurance Exchange building, Sioux City, Iowa, consulting engineer. (Noted in STEEL, Feb. 7, 1938.)

Texas

AUSTIN, TEX. — Lower Colorado river authority, Austin, Roy Fry, chairman, has plans near completion and proposes to begin work early in spring on new Tom Miller dam and hydroelectric power plant on the Colorado river. This is the last of four to be built by the authority for power and flood control. Estimated cost $1,700,000.

ELECTRA, TEX.—City votes March 8 on $122,000 bonds for constructing light

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and power plant. If voted, PWA will supply grant of $99,918.

HOUSTON, TEX.—City receives bids March 3 for furnishing motor-driven centrifugal pump units with appurtenances for water department.

SAN AUGUSTINE, TEX.—Deep East Texas Rural Electric Co-operative has final plans in progress for constructing 100 miles rural power lines in San Augustine county. Cost $100,000. William G. Morrison, Professional building, Waco, engineer.

Kansas

RANDOLPH, KANS.—City is making survey of possibility of constructing municipal power plant. Paulette & Wilson, 311 Farmers Union building, Salina, Kans., consulting engineers.

STAFFORD, KANS.—City is considering report by consulting engineers Paulette & Wilson, 311 Farmers Union building, Salina, Kans., on construction of sewage disposal plant. (Noted in STEEL, Jan. 17, 1938.)

South Dakota

DELL RAPIDS, S. DAK. — An election will be held March 1 on a bond issue to finance constructing sewage disposal plant with WPA aid. Cost $30,000. G. R. Neher, city auditor, Buell & Winter Engineering Co., Insurance Exchange building, Sioux City, Iowa, consulting engineer.

Iowa

GARRISON, IOWA—City, O. N. Heldebrant, clerk, is taking bids to 1 p. m., March 10, for section A, 10-inch deep well; section B, deep well turbine pump; section C, pump house; section D, elevated tank and tower; section E, distribution system, for waterworks. Plans obtainable from clerk. Estimated cost $20,000.

MELBOURNE, IOWA—City is contemplating constructing new waterworks because of present supply shortage.

SIBLEY, IOWA — Town plans waterworks improvements. Cost $40,000.

Nebraska

COLUMBUS, NEBR.—Loup River Public Power District, Harold Kramer, secretary, 2307 Thirteenth street, Columbus, is taking bids to 10 a. m., March 5, for materials for constructing 3-mile 34,500-volt line from Columbus power house to hook into Polk County Rural Public Power District. Harza Engineering Co., 205 West Wacker Drive, Chicago, consulting engineer.

Montana

HELENA, MONT. — State water conservation board will take bids to March 10 for proposed pumping project at Sidney. Cost $98,000.

Nevada

BOULDER CITY, NEV. — Department of the interior, Washington, plans $5,350,000 fund for extensions and equipment installation at Boulder dam hydroelectric power station, switchyard structures and facilities and transmission lines. Work to be carried out during fiscal year beginning July 1, 1938. Bureau of reclamation, Denver, is in charge.

Idaho

NAMPA, IDAHO — City has retained L. R. Stockman, Baker, Oreg., engineer, to plan sewage disposal plant. Cost $130,000.

ST. ANTHONY, IDAHO — Mayor A. G. Miller has filed for rights on Warm river for proposed municipal plant to develop 6000 horsepower. Project involves concrete dam. Cost $100,000.

Pacific Coast

FRESNO, CALIF.—San Joaquin Light & Power Corp. and its subsidiary, Midland Counties Public Service Corp., will spend $4,326,417 for improvements in interior California in 1938. New projects soon to be under way are a 110,000-volt transmission line from LeGrand, Calif., to Mendota, Calif.; improvement of distribution system in Bakersfield, San Luis Obispo and Taft; new substation at Dairyland, enlargement of Semitropic station at Wasco, and new substation on G street, Fresno.

LOS ANGELES—A new store building to cost $1,000,000 will be erected at Wilshire boulevard and New Hampshire street for I. Magnin Co., department store. Equipment will cost an additional $500,000.

LOS ANGELES — Los Angeles water and power bureau, 207 South Broadway, has tentative plans for new three-story electrical equipment and repair shop at 1630 North Main street. Cost with equipment close to $400,000. Will also construct load dispatcher building on South Boylston street. Cost $50,000.

BONNEVILLE, OREG. — Department of interior, Washington, is arranging $900,000 fund for constructing transmission lines for Bonneville hydroelectric power project. Work begins during fiscal year beginning July 1, 1938. United States engineer office, Bonneville, is in charge.

SCIO, OREG. — Williamette Valley Lumber Co. is planning to build modern sawmill in this area.

TOLEDO, OREG. — Otter Rock District has approved bond issue to finance proposed water system.

ALMIRA, WASH. — Lincoln county has granted franchise to North Ridge Power & Light Co. to construct 36 miles power line, and to Sassin Power & Light Co. for 13½ miles of line.

COULEE CITY, WASH. — Frank A. Banks, reclamation engineer in charge of the Coulee project, will receive bids soon for furnishing five power generating units, three with 165,000-kilowatt capacity each, and two with 10,000-kilowatt capacity each for secondary power dam, pumping plant and reclamation project.

SEATTLE — American Can Co. is building a plant addition at 2601-25 Elliott avenue, designed by company engineers. A. W. Quist, general contractor. Cost $35,000.

WENATCHEE, WASH. — N-K Distributors Inc., 17 North Wenatchee avenue, has been formed with $75,000 capital to deal in machinery. Frank Kammer and associates, incorporators.

Canada

WINNIPEG, MAN. — Leeders Ltd., C. H. Leeder, secretary, 1375 Portage avenue, is in the market for two armature and two coil-winding machines, an electric casting furnace, punch press, and two electric duplicating soft-metal machines for making door handles, locks, and other types of hardware.

OTTAWA, ONT. — Secretary, Canadian broadcasting commission, soon takes bids for two radio stations (50,000 watts each), one in maritime province, and one in western province.

CHELSEA, QUE. — Gatineau Power Co. Ltd., 140 Wellington street, Ottawa, Ont., soon takes bids for installing additional 60-cycle 34,000-horsepower generating unit at plant on Gatineau river, six miles from here. Private plans. Total project cost $450,000.

HULL, QUE. — Gatineau Power Co. Ltd., 140 Wellington street, Ottawa, Ont., soon takes bids for constructing 110,000-volt circuit to be added to existing six miles of transmission line from company's Farmer's rapids hydroelectric plant, one mile south of Chelsea plant on Gatineau river, to switching station here. Private plans. Cost $300,000.

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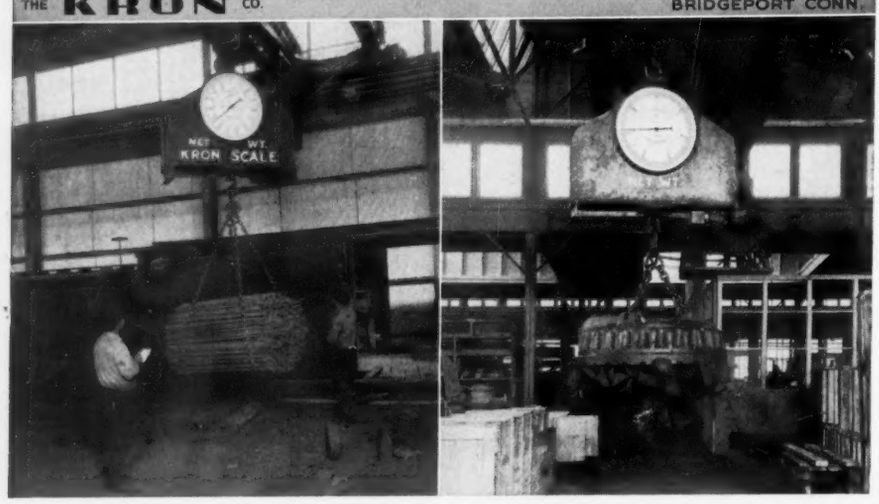
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